DOCUMENT RESUME

ED 025 678 08 VT 007 752

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The Training and Technology Project Experimental Research Program for Vocational-Technical Teachers. Final Report.

Oak Ridge Associated Universities, Tenn.; Tennessee Univ., Knoxville.

Spons Agency-Office of Education (DHEW), Washington, D.C.

Bureau No-BR 6-2329

Pub Date Dec 68

Grant-OEG-2-6-062329-1865

Note-383p.

EDRS Price MF-$1.50 HC-$19.25

Descriptors-Course Content, *Curriculum, Experimental Programs, Industrial Education, Inservice Teacher Education, *Institutes (Training Programs), Interagency Cooperation, Organization, Participant Characteristics, Participant Satisfaction, Preservice Education, *Program Descriptions, Program Evaluation, Questionnaires, School Industry Relationship, *Teacher Education, *Trade and Industrial Teachers

Identifiers-Oak Ridge Y 12 Plant, TAT, *Training and Technology Project, Vocational Technical Teacher Institute

Over a 31-month period from June 1966 to December 1968, the University of Tennessee and Union Carbide Corporation conducted preservice and inservice institutes for 160 industrial education teachers. These institutes carried college credit and covered Mechanical Technology and Drafting, Industrial Electronics Technology, Machine Shop and Fabrication, and Physical Testing and Welding Technology. Participants included teachers, retired or discharged military personnel, and industrial employees. The institutes included both technical and professional education courses to upgrade teachers by providing training on realistic industrial equipment in a climate combining industrial methods, processes, production, and production standards. Facilities at the Oak Ridge Y-12 Plant were utilized in these institutes. Costs for these programs were about $225 per week per participant, of this $36-39 was for industrial participation. Appendixes include: (1) Course Outlines, 1966 and 1967 Inservice Institutes, (2) Statistical Profiles and Participants, (3) Evaluation Reports, (4) Followup Surveys and (5) Curriculum Description. (EM)

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FINAL REPORT

Project No. 6-2329
Grant No. OEG-2-6-062329-1865

THE TRAINING AND TECHNOLOGY PROJECT

EXPERIMENTAL RESEARCH PROGRAM FOR VOCATIONAL-TECHNICAL TEACHERS

Oak Ridge Associated Universities
P. O. Box 117
Oak Ridge, Tennessee 37830

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ED025678
VT007752

December 1968

U. S. Department of
HEALTH, EDUCATION, AND WELFARE

Office of Education
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The research reported herein was performed pursuant to a grant from the Office of Education, U. S. Department of Health, Education and Welfare, and an interagency agreement with the U. S. Atomic Energy Commission, Oak Ridge Operations, Oak Ridge, Tennessee. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Bureau of Research

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SUMMARY OF PROJECT

Grant Number: OEG 2-6-062329-1865
Title: Experimental Research Program for Vocational-Technical Teachers
Principal Investigators: E. C. Merrill and Wendell H. Russell
Institutions: University of Tennessee, Oak Ridge Associated Universities, and
Union Carbide Corporation, Nuclear Division
Duration: June 3, 1966, through December 20, 1968

PURPOSE AND OBJECTIVES. The Training and Technology Project's "Experimental Research Program for Vocational-Technical Teachers," designated as the Vocational-Technical Teacher Institute, was designed to test the hypothesis that vocational education and industry, by working closely together, can develop and operate viable new programs to prepare and update teachers of vocational and technical subjects. This approach adds significantly to existing means of updating and preparing these teachers at a time when they are critically needed for an expansion of programs in human resource development.

The project sought to achieve these specific objectives:

1. Establish ways to bring vocational shop, laboratory, and classroom instructors in selected industrial occupational areas as close as possible to current industrial practices and technology.
2. Develop vocational-technical teacher preparation programs in an industrially oriented atmosphere.
3. Stimulate and assist in establishing similar ongoing programs.

PROCEDURES. Over a 31-month period, from June 3, 1966, to December 20, 1968, the Industrial Education Department of the University of Tennessee joined with Union Carbide Corporation, Nuclear Division, to conduct teacher training programs within facilities provided by the U. S. Atomic Energy Commission at its Oak Ridge Y-12 Plant. The Y-12 Plant is operated for AEC by UCC-ND under contract. Oak Ridge Associated Universities, an AEC prime contractor, developed and initiated the program, provided management services, and coordinated experimentation and information activities.

Institutes for experienced (in-service) teachers and prospective (pre-service) teachers were conducted and tested over two cycles.

The first In-Service Vocational-Technical Teacher Institute was held for nine weeks during the summer of 1966 for 60 teachers in drafting, machining, and electronics from 10 Southeastern states. After the close of the program, it was analyzed thoroughly, and many of the findings and recommendations were incorporated into a second institute held during the summer of 1967 for 100 teachers in the same three technical fields, plus physical testing-welding.

The initial Pre-Service Vocational-Technical Teacher institute was conducted during the University of Tennessee's nine-month 1966-67 academic year; and the second institute was held the following year. They were designed to provide one year of off-campus technical and professional studies toward a bachelor of science degree in industrial education.

Both types of institute provided college credit for professional education courses taught by university faculty members and for technical courses conducted by experienced engineers, scientists, technicians, and craftsmen of Union Carbide Corporation, Nuclear Division.

Internal and external program evaluations were conducted. Internal evaluation methods included surveys of participant attitudes and reactions during the institutes, follow-up questionnaires and visits, and critical analysis by staff personnel. External evaluation was achieved through the use of panels of observers representing education, industry, and government.

The Oak Ridge Y-12 Plant, site of the project, is one of the largest and most versatile of the AEC's facilities. It carries out production and development operations vital to the nation's nuclear energy and space programs and has exacting performance standards, highly versatile skills, and unique production capabilities.

RESULTS, CONCLUSIONS AND RECOMMENDATIONS. Following is a summary of principal project findings and recommendations in terms of the general hypothesis and specific objectives.

I. Industry-Education Combination

Education and industry, by working closely together, not only were able to develop highly effective teacher training programs, but in the process each institution found new and more effective ways to utilize its own resources. In addition, each institution gained insight into the requirements and capabilities of the other.

A third party, Oak Ridge Associated Universities, performed an essential function in effecting the initial combination of resources through proposal development and negotiation. Its role as fiscal agent and in providing administrative services and management coordination was necessary early in the program, but as the institute demonstrated its operational viability, the two principal participating organizations were able to assume larger responsibilities in these areas.

The extent of a third-party role in other industry-education combinations would depend largely upon the size and complexity of the project. The more complex, the more need there will be for an agent or agency experienced in the details of program development, including initial operational details.

2. In-Service Application

Updating experienced vocational-technical teachers through an institute in an industrial setting surpasses traditional methods in both effectiveness and adaptability to individual needs. As a condition of certification maintenance, the teacher normally is required to return periodically to industry, usually through a summer job. If he is a non-degree teacher (and this includes most vocational teachers), he is required periodically to attend university or extension courses in industrial education. The In-Service Vocational-Technical Teacher Institute combined both requirements into an integrated, compact experience responsive to the needs of teachers in today's changing industrial technology. In addition to technical and professional education, the institute provided participants with a variety of personal associations with other teachers and staff members which contributed significantly to their professional development.

Ninety-four per cent of the participants responding to a follow-up survey felt the institute had made a definite contribution to their career growth, especially through the provision of a new and broader professional-technical background in the subject areas and the opportunity to develop and exchange new course materials directly applicable to their own areas of instruction.

External evaluations confirmed the judgment of the staff that the provision of stipends to participants is essential to effective recruitment for an in-service institute. Program objectives are also best realized, it was found, if the emphasis in recruitment is on specific target groups whose vocational teaching responsibilities are closely related to one another and to the institute curriculum.

3. Development of Pre-Service Programs

According to findings of the two Pre-Service Institutes, the complex problem of attracting and preparing significant numbers of persons for vocational-technical teaching careers must be approached from at least two directions. First is the need for stepped-up recruitment, including a continuing search for new sources of prospective teachers. Second, programs and methods of preparing persons for teaching must be responsive to the special requirements of those who pursue vocational and technical teaching careers.

Prospective industrial education teachers are expected to have a journeyman level of competence in their trades prior to employment as teachers. Thus, they are actually changing careers, and programs designed to assist in the transition must consider their need to maintain income stability.

Experimentation in recruitment, scheduling, and program content was conducted during the two pre-service cycles. The resulting specific observations can be reported:

- Substantial numbers of qualified persons in industry would be interested in changing to vocational teaching careers, or at least part-time teaching, if they were aware that the possibility existed and if more preparatory programs were available at convenient times and locations.
- Recently discharged or retired military personnel are a source of well qualified prospective teachers. They are in need of a second career and have the means, through GI benefits or retirement pay, to support themselves and their families while they are making the transition.
- The pre-service institute in an industrial setting provides a well-integrated program for preparing and enriching prospective teachers professionally and technically in a rather short time. Its adaptability to individual needs makes it particularly well suited to the preparation of ex-military personnel who have rich but highly varied technical and educational backgrounds. It also provides an efficient means for persons currently in industry to gain a broader perspective on current technology within their own field and related areas before taking up teaching careers.

4. Replication Activities

As a result of the Vocational-Technical Teacher Institute experience, the University of Tennessee is continuing in modified form both the pre-service and in-service programs. The five-year project, funded by the U. S. Office of Education, will (1) recruit and train on a year-round basis prospective teachers from among retired and discharged military personnel and presently employed industrial workers, and (2) continue the updating and upgrading of experienced teachers through a series of three-week in-service institutes in conjunction with non-resident course work.

In addition to the new University of Tennessee program, the in-service institute concept is being replicated in modified form in two other sections of the Southeast. The Langley Research Center of the National Aeronautics and Space Administration, in cooperation with Old Dominion College and the State Industrial Education Service, conducted a six-week program for 22 vocational teachers at Hampton, Virginia, during the summer of 1968 and plans an expanded program in 1969. A similar program is under development in Georgia that combines the resources of the Georgia Department of Vocational Education, University of Georgia, and Lockheed-Georgia Corporation of Marietta. Both projects are a direct outgrowth of program development activities of the TAT institutes.

5. Additional Work To Be Done

Necessary followup to the Vocational-Technical Teacher Institute, if the maximum benefit from the TAT experience is to be realized, includes: (a) further systematic effort to define the scope and content of advanced industrial technology which is relevant for instructional purposes in short-term vocational programs; (b) additional development of a methodology for extending the TAT concept of training to other regions and for bringing about more effective cooperation among the 10 participating states in the Southeast; (c) investigation of the effects of stipends on the ability to recruit prospective vocational-technical teachers and to bring the numbers entering this profession into line with urgent present and anticipated needs for vocational teachers; and, finally, (d) further efforts to organize and disseminate for instructional use the significant body of TAT experience and information on the training of the disadvantaged.

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CHAPTER 1

INTRODUCTION

Occupational training, a major instrument in the nation's efforts to develop its human resources, faces severe handicaps from a shortage of qualified teachers.

Anticipating that the number of persons needing and desiring occupational training will double by 1975, the Educational Advisory Committee of the Appalachian Regional Commission gloomily forecasts: "Even if a firm commitment were made now to meet all needs fully ... faculty recruitment and training would create time lags which would seriously erode the capabilities of even the most efficiently administered program."[1]

In addition to the need for more programs, there is a need to overcome the inadequacies facing vocational and technical teacher-training programs. The proposal for the Training and Technology project stated four problems:

1. The escalation of required skills and technical knowledge needed in industry has outmoded program concepts and teacher resources.
2. New skills and technical knowledge require more advanced general education levels as prerequisites.
3. Industrial demands for skilled and knowledgeable workers tend to drain educational institutions of teaching talent.
4. Advanced technical processes require expensive and often unavailable equipment for effective teacher training and such equipment is increasingly less available in schools for this purpose.[2]

These problems must be met in programs designed to prepare persons to enter vocational and technical teaching and in programs to update and upgrade experienced teachers.

There are many existing resources which can be used to alleviate the above four problems. A most fitting resource is industry—a major beneficiary of these teachers' efforts. A 1965 study of Southern resources stated that many large private industries had excess training capacity (facilities, equipment, and experienced personnel) which could be brought to bear on the training process. The report suggested that these resources could be used in combination with those of universities and other applicable organizations to increase the teacher preparation of the region.[3]

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[1] Education Advisory Committee to Appalachian Regional Commission, Interim Report (1968), p. 31.

[2] Oak Ridge Associated Universities, Proposal, Training and Technology, (Revised - February 21, 1966), p. 6.

Vocational Education: Requirements and Needs

In most states vocational teachers are required to achieve advanced skill or craft proficiency (usually two years at the journeyman level) before they can be certified for teaching. Therefore, the traditional route to becoming a teacher is skill or technical development first, professional development later. In many states, craftsmen are often taken into teaching jobs with little or no professional preparation. They are given temporary teaching certificates requiring that they obtain a specified number of industrial education credits within a given number of years.

In an effort to remain current in his field of specialization, the teacher is also required to return periodically to industry through temporary employment.

Because of the requirement that vocational teachers be craftsmen in their trades, recruitment must be among persons who are or could be well employed. Many of those recruited are mature men with family responsibilities and thus for them the preparatory or transitional period to enter teaching cannot involve severe financial sacrifice.

Several weaknesses are inherent in the traditional method of preparing and updating teachers:

1. Before beginning teaching, a journeyman quite likely needs some reorientation to his craft—the latest trends, techniques and developments, and the craft's relationship to a broader current industrial technology.
2. A professional vocational educator needs to be aware of the techniques and theoretical foundations of his profession at the outset of his career.
3. A requirement that the teacher return to industry periodically through a summer job carries no assurance that the experience will be of value or meaning in his role as a teacher of current industrial technology.

Thus, a need is evident for well-planned programs of an institutional type that integrate the technical and professional experiences. Industry is a natural participant in these programs and, in fact, has a vital concern in them.

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[3] Southern Manpower Technical Assistance Program of the Oak Ridge Institute of Nuclear Studies, Resources for Southern Manpower Development (October, 1965).

Objectives of the TAT Teacher Institutes

The Training and Technology Project was designed to explore multi-organizational approaches to human resource development. Its Experimental Research Program for Vocational-Technical Teachers undertook, through a Vocational-Technical Teacher Institute, to demonstrate that vocational education and industry could work closely together to prepare and update teachers quickly and efficiently in modern industrial technology.

The two-cycle experiment developed and demonstrated (a) ways to bring vocational instructors in selected occupational areas as close as possible to current industrial practices, (b) ways to recruit and prepare persons for vocational teaching in an industrially oriented atmosphere, and (c) methods, principles, and procedures to stimulate development of similar ongoing programs.

Terminology

The terms "vocational education" and "vocational-technical education," when used in the report, refer generally to the trade and industrial segment of the broad field of vocational education.

Participants in the various programs were mostly teachers or prospective teachers in area vocational schools or in high school vocational shop programs. A few teach in technical institutes. The text in most instances refers to the participants as "vocational-technical" or simply as "vocational" teachers.

Courses in the institutes are referred to as part of either the program's "professional" or "technical" content. The term "professional" applies to those courses provided by the University of Tennessee that are intended to provide participants with the theoretical and philosophical foundations and the techniques of teaching trade and industrial subjects. The "technical" courses are those presented by Union Carbide Corporation and deal with areas of trade and industrial job knowledge.

CHAPTER 2

ORGANIZATION AND SETTING

The Vocational-Technical Teacher Institute was a component of the Training and Technology Project (TAT). TAT was developed to explore ways to utilize existing industrial resources in combination with educational institutions, governmental agencies, and other appropriate organizations for vocational and technical training of workers and teachers.

An experimental research training program, developed and coordinated by Oak Ridge Associated Universities, was carried out over a period of 31 months— June 1966 through December 1968— in the U. S. Atomic Energy Commission's Oak Ridge Y-12 Plant.

Union Carbide Corporation, Nuclear Division, industrial contractor for the AEC, and the University of Tennessee's Department of Industrial Education were responsible for the training. Included in the project were courses in six craft and technical areas for more than 500 underemployed and unemployed persons; degree credit programs for vocational-technical teachers and students preparing for teaching careers; and activities in related manpower experimentation and development.

Supported by the U. S. Department of Labor and the U. S. Office of Education through interagency agreements with the AEC, the TAT project was designed to blend the talents and capabilities of as many organizations as could significantly contribute to the goal of upgrading manpower development. Among the organizations participating were the Tennessee Department of Employment Security, the Tennessee Department of Education, the Tennessee Division of Vocational-Technical Education, and a number of labor organizations.

The three operating organizations— Oak Ridge Associated Universities (ORAU), The University of Tennessee, and Union Carbide Corporation, Nuclear Division— maintained full-time staffs at the project site, located within facilities provided by the AEC in the Y-12 Plant.

The University of Tennessee had major responsibility for the operation of the teacher training component, participated in the worker training component by providing guidance and counseling services and some educational assistance, and was active through its faculty and graduate students in experimental activities.

Union Carbide Corporation, Nuclear Division, conducted the skill and technical portions of the teacher institutes and had the major training and operational responsibility for the worker training component.

Oak Ridge Associated Universities, a nonprofit corporation of 41 Southern universities and colleges, administers a wide variety of educational and research programs under a prime contract with the U. S. Atomic Energy Commission. Its role in Training and Technology consisted of initiation and negotiation of the project in the formative stages; coordination of the operating functions with responsibility for achievement of program objectives; responsibility for evaluative procedures and subsequent corrective actions; and conduct of reporting functions. In addition, ORAU served as contracting and fiscal agent.

Teacher Training Component

The teacher training component, or Vocational-Technical Teacher Institute, consisted of a University of Tennessee industrial education program within the Training and Technology Project which provided for the operation of two types of institutes. One was the In-Service Vocational-Technical Teacher Institute for experienced teachers, and the other was the Pre-Service Vocational-Technical Teacher Institute for prospective teachers.

The University of Tennessee Department of Industrial Education had program responsibility for the VTTI, and furnished the educational director and teacher trainers. Union Carbide Corporation provided an experienced training staff composed of engineers, scientists, industrial supervisors, and skilled craftsmen for the technical courses. ORAU furnished program development, information, and management personnel.

Wendell H. Russell of ORAU was director of the TAT project; Dr. Donald E. Maurer of the University of Tennessee was the project's educational director with major responsibility for operation of the teacher component; J. Leo Waters of Union Carbide Corporation, Y-12 program manager, assisted by B. R. Pearson, training director, had major responsibility for the worker training program and the technical content of the teacher program.

Site and Facilities

The Oak Ridge Y-12 Plant, site of the TAT Project, was constructed during World War II to separate the isotopes of uranium by the electromagnetic process. When this method was made obsolete by the more economical gaseous diffusion process, the plant assumed increasingly diverse responsibilities in other programs related to defense, to peaceful applications of nuclear energy, and to the nation's space program. Today, Y-12 is a major AEC production and development facility with superior performance standards, highly versatile skills, and unique materials production capabilities geared to meeting exacting requirements and extremely close tolerances.

The Training and Technology Project was centered in Building 9709, a wartime building which was remodeled and provided with classroom, office, shop,

Chart 1

TRAINING AND TECHNOLOGY
Project Support, Organization, and Components

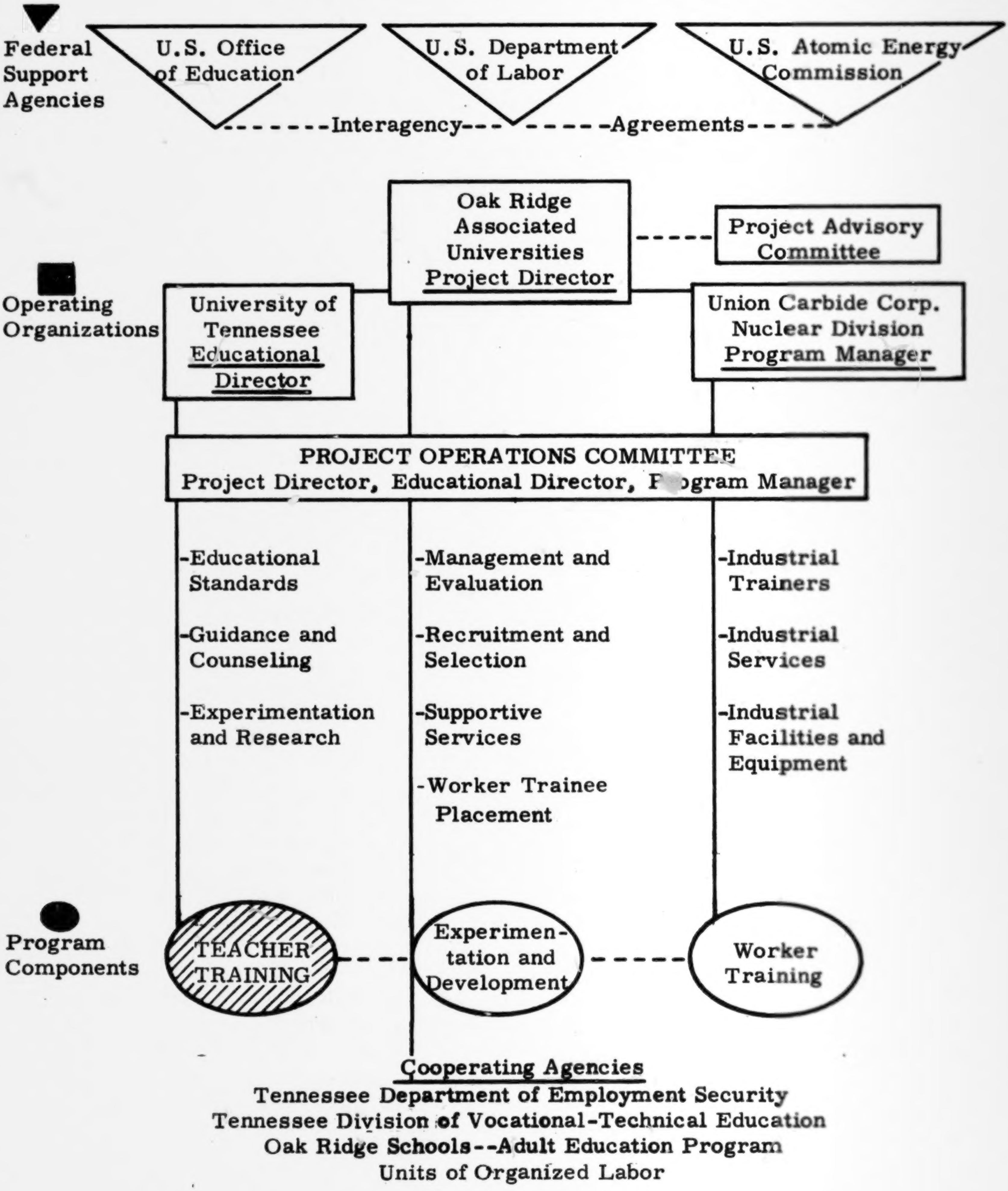
Federal Support Agencies
U.S. Office of Education
U.S. Department of Labor
U.S. Atomic Energy Commission
Interagency Agreements
Oak Ridge Associated Universities Project Director
Project Advisory Committee
Operating Organizations
University of Tennessee Educational Director
Union Carbide Corp. Nuclear Division Program Manager
PROJECT OPERATIONS COMMITTEE
Project Director, Educational Director, Program Manager
-Educational Standards
-Guidance and Counseling
-Experimentation and Research
-Management and Evaluation
-Recruitment and Selection
-Supportive Services
-Worker Trainee Placement
-Industrial Trainers
-Industrial Services
-Industrial Facilities and Equipment
Program Components
TEACHER TRAINING
Experimentation and Development
Worker Training
Cooperating Agencies
Tennessee Department of Employment Security
Tennessee Division of Vocational-Technical Education
Oak Ridge Schools--Adult Education Program
Units of Organized Labor

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Chart 2

VOCATIONAL–TECHNICAL TEACHER INSTITUTE

Schedule of Training Sessions
May 1966–December 1968

May – June 1966
Inception of Teacher Program

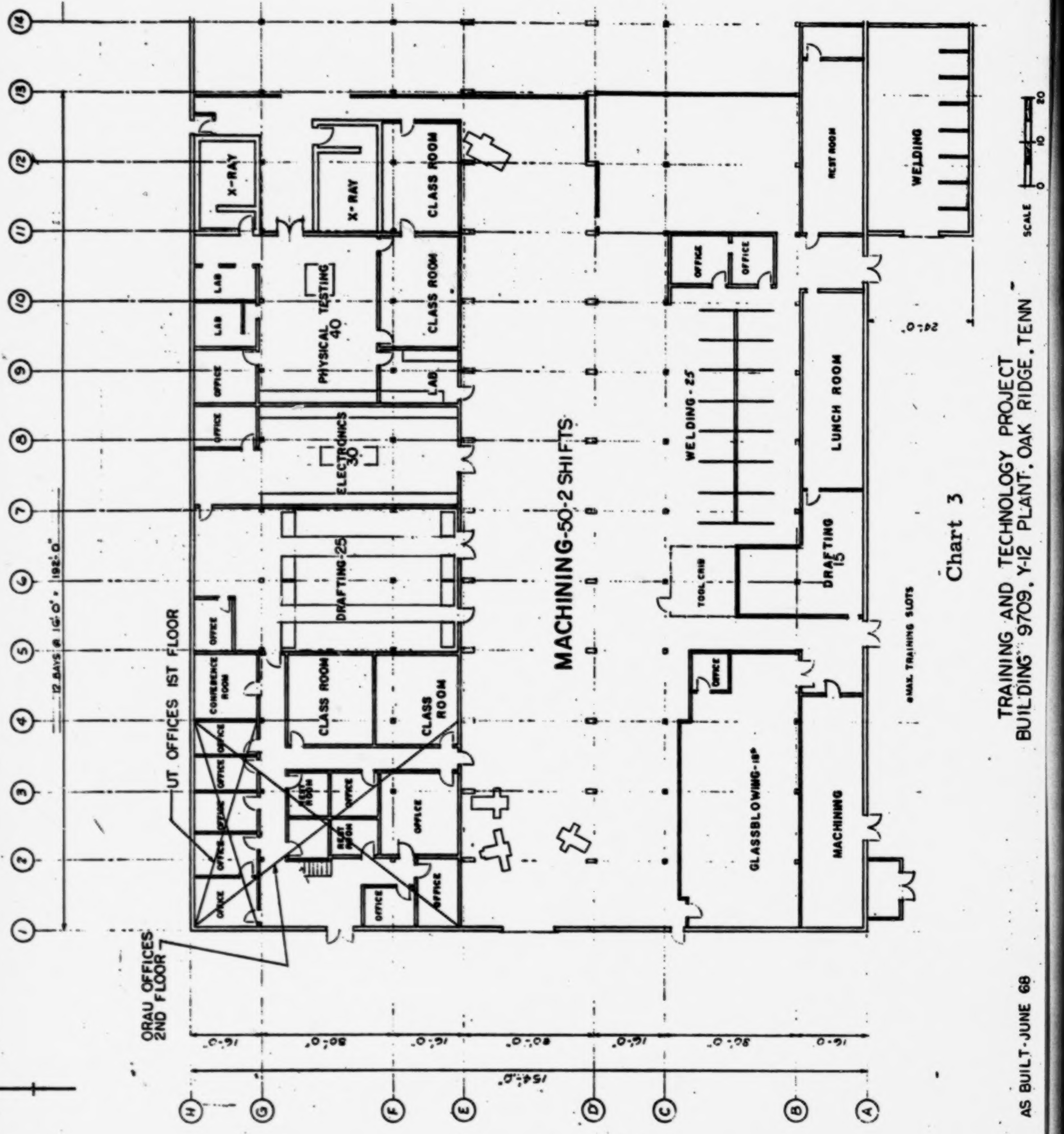
☐ June 27 – August 26, 1966
In-Service Teacher Institute – First Cycle

☐ September 12, 1966 – June 9, 1967
Pre-Service Teacher Institute – First Cycle

☐ June 19 – August 11, 1967
In-Service Teacher Institute – Second Cycle

☐ September 18, 1967 – June 9, 1968
Pre-Service Teacher Institute – Second Cycle

July – December 1968
Follow-up and Final Report


12 BAYS @ 16'-0" = 192'-0"
UT OFFICES 1ST FLOOR
ORAU OFFICES 2ND FLOOR
X-RAY
LAB
LAB
OFFICE
OFFICE
OFFICE
CONFERENCE ROOM
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
X-RAY
PHYSICAL TESTING 40
CLASS ROOM
CLASS ROOM
LAB
ELECTRONICS 30
DRAFTING-25
CLASS ROOM
CLASS ROOM
REST ROOM
OFFICE
REST ROOM
OFFICE
OFFICE
OFFICE
MACHINING-50-2 SHIFTS
OFFICE
OFFICE
WELDING-25
TOOL CRIB
OFFICE
GLASSBLOWING-18
REST ROOM
WELDING
LUNCH ROOM
DRAFTING 15
MACHINING
MAX. TRAINING SLOTS
24'-0"
SCALE
0
10
20
16'-0"
80'-0"
16'-0"
80'-0"
16'-0"
80'-0"
16'-0"
154'-0"
A
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C
D
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14
AS BUILT-JUNE 68

Chart 3

TRAINING AND TECHNOLOGY PROJECT
BUILDING 9709, Y-12 PLANT, OAK RIDGE, TENN

10-/

and service areas for TAT use. In addition to 9709, meeting facilities were used by the project in Buildings 9720-6 and 9720-8. The Y-12 electronics standards laboratory, adjacent to the main TAT building and containing some of the world's most advanced electronics equipment, was utilized frequently in both the teacher and worker training programs.

All of the buildings listed were in an area of the plant which was designated in the fall of 1966 as unclassified. Thus, participants and staff members, while required to wear identification badges, were not subject to the personnel security regulations in effect in other portions of the plant.

However, the first In-Service Institute in the summer of 1966 was conducted before remodeling was complete on building 9709 and before the area had been designated as unclassified. Thus, in addition to utilizing temporary classroom, shop, and office facilities in other portions of the plant, security regulations limited the movement of the participants and availability of the plant's facilities.

Facilities and equipment were furnished to the project by the AEC without capital or rental cost. Through appropriate scheduling of equipment demands for production and regular work requirements, Y-12 was able to make available for instructional purposes machinery and laboratory apparatus not currently needed in full-time operations. Many of the training supplies came from surplus stocks.

CHAPTER 3

IN-SERVICE INSTITUTES

M. E. Spotswood's[1] machine shop is located on the fringe of the space age. It is 35 miles from a major space center and only a few blocks from a missile components firm.

But in 1966, Spotswood's shop and the space age were decades apart in technology.

Spotswood, a high school vocational machine-shop teacher, was using pre-World War II equipment in an effort to teach his students the skills they needed to enter the 1966 job market.

Most of his students had not heard of numerical and tracer-controlled machines, digital readout systems, or the concept of true position dimensioning. And until the summer of 1966, Spotswood was only vaguely aware of them. He had been away from industry four years.

Thus, Spotswood's students were largely out of step with modern industry the day they received their high school diplomas. Meanwhile, industry was desperately seeking machinists here and abroad.

As a participant in the first TAT In-Service Vocational-Technical Teacher Institute operated for nine weeks during the summer of 1966, Spotswood was able to narrow somewhat this gap between the classroom and industry. And in the process, he was able to acquire 12 hours of additional credit toward his bachelor of science degree in industrial education.

The institute did not solve Spotswood's equipment problems nor did it suddenly thrust him into the forefront of space-age technical know-how. But it did bring him abreast of some of the vital developments in his field, presented him some methods of transmitting them to his students, and provided an opportunity for him to mingle with other teachers with similar problems and some new ideas for solving them.

The story of the In-Service Institutes is partly one of how to identify and recruit the Spotswoods. It is partly one of how to make the most effective use of the industrial and university resources in upgrading the teachers technically and professionally.

But it also is a story of how two established institutions—education and industry—recognized that through the development of imaginative new programs they can jointly attack problems of mutual concern.

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[1] The man referred to as M. E. Spotswood was a participant in the 1966 In-Service Institute, but his name has been changed for purposes of this report.

Institute Purpose and Operational Plans

The 1966 In-Service Institute operated from June 27 to August 26 for 60 teachers from 10 Southeastern states. Twenty teachers were enrolled in each of three occupational areas—machine shop and fabrication, mechanical technology and drafting, and industrial electronics. Coursework was conducted five days a week, eight hours a day for eight weeks. The first week was devoted to orientation and testing.

Each enrollee was required to choose two of five industrial education courses offered by the University of Tennessee. During the three-hour morning session, he attended two classes and devoted one hour to study or guidance and counseling sessions. The first hour after lunch each day consisted of a technical seminar for all participants. The remaining four hours were for lectures, demonstrations, and shop work in the three technical areas.

The 1967 institute (second cycle) was conducted for 100 teachers in four technical areas—machine shop and fabrication, mechanical technology and drafting, industrial electronics, and physical testing-welding. The length was reduced to eight weeks, from June 19 to August 11. The institute day remained divided into mornings for industrial education coursework and afternoons for technical seminars and shop or lecture in the four specialized areas. However, the course content, particularly in the industrial education segment, was changed extensively from the previous summer. Other changes in internal format were made in keeping with findings and recommendations resulting from evaluations of the 1966 institute. (See Appendix A, Course Outlines, 1966 and 1967 In-Service Institutes.)

Recruitment and Selection

The Institute moved from a rather general recruitment of vocational education practitioners in 1966 to a more restrictive selection in 1967.

A mixture of vocational teachers, industrial arts teachers, college industrial education instructors, and at least one vocational school administrator provided the Institute in 1966 with an enrollment broadly representative of industrial education occupations. While this had some experimental advantages, subsequent evaluations strongly recommended that the program would be more effective if enrollment were restricted to homogeneous groupings of teachers.

The 1967 institute achieved approximately the desired enrollment by limiting selection as nearly as possible to persons "currently teaching courses closely related" to institute offerings and whose students "must be persons planning to enter skilled or technical vocations." These requirements eliminated administrators, industrial arts teachers, college industrial education instructors, and persons teaching in vocational areas only slightly related to institute offerings.

As a result, 66 persons attending the 1967 institute were teaching full time in the specific area to which they were appointed. Twenty-seven others taught from 25 to 75 per cent of their time in the major area, while the remaining seven teachers taught in related areas.

Recruitment for the 1966 institute was hampered by a lack of lead time. The project proposal had included a three-month period for recruitment, staffing, and planning, but a delay in funding eliminated the entire period. Recruitment started some 30 days before the institute was scheduled to begin, even though approval had not yet been received. Recruitment, selection, and pre-enrollment activities for the 1967 institute were conducted over a 3 1/2-month period. This accounted in part for the more thorough screening.

Close liaison in recruitment for both cycles was maintained with directors of vocational education in the 10 Southeastern states. Most participants in the 1966 institute were first recommended by their state directors. In 1967 this plan was modified in an effort to give additional teachers the opportunity to apply. The main recruitment source remained lists of candidates submitted by state directors, but brochures inviting individual applications also were sent to vocational and technical schools and industrial education departments of universities. All individual applicants, however, were sent forms requiring the approval of their immediate supervisors and state directors of vocational education before the applications would be considered. About three-eighths of the applicants first applied as individuals.

Of the 160 teachers who attended the two institutes, 103 held no degrees, 44 held bachelor's degrees only, and 13 held master's degrees. (Appendix B lists participants in the institutes and provides statistical profiles of the two groups.)

Recruitment of Negroes

Negroes, particularly in the South, have until recently had almost no employment opportunities in industrial skill and technical areas. As a result, Negro instructors in industrially oriented vocational courses are scarce. During both institutes special efforts had to be made before adequate numbers of Negroes were enrolled.

In 1966, after lists of candidates received from the states contrained names of only four Negroes, the project staff contacted the heads of vocational education or industrial education departments of 10 Negro land-grant colleges and the Tuskegee Institute. They were asked for names of graduates or faculty members who might qualify for the institute. Thirteen additional applications resulted, for a total of 17. Sixteen Negroes eventually attended, but most either were industrial education teachers in colleges or their vocational areas were only slightly related to institute offerings.

In 1967 a staff member was assigned to Negro recruitment at the outset and for several weeks spent a substantial portion of his time contacting Negro colleges, universities, and vocational high schools. The expanded efforts were necessitated by the more specific qualifications for the 1967 institute. Seventeen applied, 11 of whom were found to qualify and subsequently attended the institute.

Preparation and Orientation

The TAT staff learned quickly that in conducting programs for vocational and technical teachers the schedule must be filled with challenging, meaningful experiences. Participants reacted without hesitation to time lags and poor presentations.

Because of the close proximity of funding approval to the actual starting date of the first institute, appointments to staff and planning functions had little lead time. This lack of lead time for planning resulted in some schedule gaps and lack of course orientation that were in most cases corrected as the institute progressed. However, it was impossible to correct those that involved major program revisions until the 1967 institute.

The 1966 institute allotted a week for orientation and testing of participants. When this proved to be excessive time for these activities, the 1967 institute was reduced from nine to eight weeks, with the first two days scheduled for orientation and testing.

Industrial Education Offerings

The industrial education portion of the 1966 institute consisted of five standard courses: "Audio-Visual Media," "Conference Leadership," "Curriculum Building," "Methods of Teaching Shop and Related Subjects," and "Shop Organization and Management." The courses, normally taught in a 12-week quarter, were reduced to eight weeks through more intensive scheduling. Each participant was required to enroll in two courses.

The limited industrial education offerings meant that approximately one-third of the participants were enrolled in one or both of the courses for a second time. Lack of advance preparation time resulted in courses being taught very nearly as they were on the main campus. While course assignments included preparation of audio-visual aids, notebooks, lesson plans, and job sheets, there was not as much coordination between these activities and the institute's technical content as there could have been with adequate preparation time.

This lack of coordination was pointed up strongly by participants in their written evaluations of the program and by the panel of experts which met September 9 to evaluate the institute.

As a result, the industrial education offerings in 1967 were restructured in line with the institute's concept of presenting the latest developments and techniques in industry and education. The University eliminated the five standard industrial education courses in favor of two new courses entitled "Seminar in Industrial Education" and "New Developments in Industrial Education." For participants seeking graduate credit, the courses were given identical titles but higher course numbers and an additional project was required of each graduate student.

The seminar and new developments courses carried three hours of credit each, and all participants were enrolled in both courses. Emphasis was placed on exploration, discussion, and interchange of ideas, with a focus on how to relate new industrial developments to instructional content, course outlines, instructional units, information sheets, visual aids, and equipment needs in the home teaching situation. Knowledgeable people from vocational education lectured on such topics as legislation, current trends, and state, regional, and national vocational education activities. Lectures, workshops, and demonstrations were presented by leading manufacturers and distributors of teaching-aid equipment.

Among the materials each participant was required to prepare were:

- An indexed notebook covering the industrial education seminars, technical seminars, field trips, demonstrations, workshops, and vocational guidance sessions.
- Revised course outlines reflecting how he intended to incorporate the new information acquired in both the technical and professional portions of the institute into the courses he would teach the following fall.
- A complete unit of instruction from his technical area, including two lesson plans, six instruction sheets, and ten transparency originals for an overhead projector. Since there were 25 teachers enrolled in each technical area, a total of 50 lesson plans, 150 instruction sheets, and 250 transparency originals were prepared for each of the four areas. At the end of the institute all of the materials were reproduced and copies were given to every other institute participant (a package of some 3,000 sheets of instructional materials and accompanying visual aids).*

Five program assistants, all of whom were participants in the 1966 institute, were employed to assist in the 1967 institute. They worked closely with the 1967 class in all assignments, both technical and professional. Their primary responsibility was the coordination of industrial education assignments with activities in the technical areas.

The 1967 institute shifted its emphasis in vocational guidance from individual and group counseling of participants to an instructional program designed to provide the teachers with a broader understanding of the purposes and functions of vocational guidance and ways to work with the guidance staffs in their schools.

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* A limited number of sample copies of this material are available upon request from the TAT Project.

As in 1966, each participant took a battery of tests during the initial orientation period and test results were reported to the individuals by the guidance staff. In 1967, however, emphasis was placed on interpreting the test results in terms of the uses of testing in vocational schools. The guidance staff also conducted large and small group seminars in which participants explored components of sound guidance programs and uses of testing. The small group seminars placed emphasis on providing individualized information for the participants, including assistance in developing vocational guidance programs to fit their needs.

Each participant was given a notebook on vocational guidance compiled by the project's guidance and counseling staff.

Technical Seminars

In an effort to acquaint participants with as broad a range of current industrial technology as possible, one-hour seminars were held each day. A scientist, engineer, or other specialist in one of the three AEC installations in Oak Ridge presented a lecture or demonstration at each seminar. Topics included such diverse subjects as the necessity of standards and their relationship to industry, design and construction of semi- and ultra-clean rooms for fabrication use, nondestructive testing of engineering materials, effects of temperature on precision machine tools, electronic instrument engineering, new developments in close tolerance machining, and critical path scheduling.

In 1967 the seminar schedule was reduced to approximately two sessions per week and those topics were included which received the highest ratings from the previous year's participants in the follow-up survey. Three afternoons were utilized in tours of the Oak Ridge Gaseous Diffusion Plant (K-25), Oak Ridge National Laboratory (X-10), and the University of Tennessee School Planning Laboratory.

Technical Coursework (Lecture and Shop)

Afternoons, from 1 to 4:30, were devoted to technical work in the area in which each participant was enrolled. In 1966, 20 participants were appointed to each of the three technical areas: mechanical technology and drafting, machine shop and fabrication, and industrial electronics. In 1967, 25 persons were selected in each of four areas offered. These areas included the three offered in 1966 plus physical testing-welding.

The University's Department of Industrial Education awarded six hours of credit for successful completion of the technical portion of the institute.

The technical instructional staff consisted of a supervisor in each of the four areas plus various part-time assistants and lecturers. Each supervisor also held a supervisory position in the regular Y-12 operation. Instructors and lecturers also held supervisory, technical, or craft jobs in the Y-12 organization.

Coordination of the Y-12 portion of the program was performed by the Y-12 program manager, assisted by a full-time training director and an assistant to the manager.

During the 1966 Institute, technical instruction was oriented toward lectures supplemented with technical information and slides or films from the Y-12 technical library. Less emphasis was placed on actual operation of equipment by the participants. The staff felt emphasis on classroom instruction would enable a broader presentation of current industrial technology than an approach heavily oriented toward hands-on activity.

During the operation of the Institute and at the close, the teachers indicated strongly that they felt heavier emphasis should be placed on actual operation of machines and equipment rather than lectures. The September 9 evaluation team generally concurred.

However, follow-up visits to about one-third of the teachers in December 1966 and a follow-up survey of all participants in late January 1967 indicated some shift of opinions. A larger number now indicated that the emphasis on technical theory rather than hands-on applications had proved to be more helpful. Therefore, although emphasis in the 1967 institute was shifted toward additional applications of theory and opportunities to operate equipment, there was no attempt to downplay the theoretical approach.

Following is a brief summary of the 1967 technical curriculum:
Mechanical Technology and Drafting - The course was composed of about 40 per cent lecture and 60 per cent laboratory experience. Topics included true position dimensioning, programming for numerically controlled machine tools, value analysis, critical path scheduling, and industrial reproduction and microfilming techniques.
Industrial Electronics Technology - The course consisted of about 60 per cent lecture and 40 per cent laboratory work. Emphasis was placed on numerically and tracer controlled machine tool maintenance, computer circuitry, and printed circuit boards. Also included were a wide variety of industrial instrumentation systems and techniques, including alarm systems, high vacua, leak detection, standards laboratory techniques, micro-electronics, and lasers.
Machine Shop and Fabrication - The course consisted of about 50 per cent shop work and 50 per cent lecture. Emphasis was placed on numerically controlled machine tool operation and advanced techniques in tool maintenance. Other topics included dimensional inspection, quality assurance, materials and properties of metals, and physical testing, welding, and mechanical drafting techniques as they relate to machining.
Physical Testing and Welding Technology - The course consisted of about half lecture and half laboratory work, with the laboratory portion equally divided between welding and physical testing. The physical testing curriculum emphasized nondestructive techniques, including radiography, ultrasonics, and magnetic particle and

penetrant testing. Special applications of testing procedures to welding were emphasized. The largest bloc of the welding curriculum consisted of a study of modern metal joint processes, including soldering, brazing, resistance welding, induction welding, thermit welding, electron beam welding, laser welding, solid state bonding, ultrasonic welding, welding of plastics, and adhesive bonding.

Periodic check tests and a final examination were given on the material covered in each of the technical courses.

Guidance and Counseling

The guidance and counseling staff consisted of eight part-time counselors, mostly graduate students at the University of Tennessee. A full-time guidance coordinator joined the program three weeks after the start of the 1966 institute.

The counseling staff served dual but related functions (1) as gatherers of data, primarily through testing and personal data forms and interviews, and (2) in the traditional role of vocational and personal counselors. Tests or inventories given during the orientation period included the Nelson-Denny Reading Test, the numerical section of the College Qualification Test, the 16th Personality Factor Questionnaire, and the General Aptitude Test Battery. The latter was administered by the Tennessee Department of Employment Security. The Ohio State trade achievement tests were selected as a measure of trade proficiency and administered five weeks after the institute opened.

The guidance staff was most valuable in gathering data and as a sounding board for the participants' reactions to the program. There was not, however, a great demand or need for the staff's services in personal and vocational counseling.

In the 1967 institute it was decided that the time allotted in 1966 to counseling sessions could be devoted more profitably to seminars designed to acquaint the participants with current guidance programs. Emphasis was placed on making participants aware of how they could work with and utilize counselors in their schools. A questionnaire administered at the initial session indicated that most of the participants had vague or mistaken notions of the purposes of guidance and counseling. An exit questionnaire indicated a clearer understanding of the role of a counselor and a willingness to work more closely with their counselors.

Cost Considerations

Because the TAT institutes were designed primarily to demonstrate a concept of teacher training in an industrial setting, along with some operating principles, costs should be viewed as unique to this project. However, when related to program segments, some of the costs may have value as guidelines in the operation of programs based on the TAT concept.

As previously stated, there were no capital costs chargeable to the project for either the equipment or facilities. Both were provided by the Atomic Energy Commission, Oak Ridge Operations.

Costs to Oak Ridge Associated Universities in connection with operation of the two institutes were, except for information, recruitment, and supportive service activities, almost entirely associated with management, experimentation, and program development. They cannot, therefore, be considered training program operating costs.

Probably the most significant costs from the standpoint of replication of the institute concept were those associated with industrial involvement. These costs consisted primarily of salaries of training supervisors, instructors, and lecturers for time spent on institute activities, plus supplies and materials used. For the 1966 institute these costs to Union Carbide were $20,695, which amounted to $39 per week per participant. In 1967 the total Union Carbide costs were $28,913, but the increase in enrollment reduced the costs per participant to $36 per week.

The largest single expense for the institutes consisted of stipends to participants of $75 per week plus dependency allowances. A total of $55,061 was spent in stipends in the 1966 institute (an average of $102 per week per participant) and $83,211 in 1967 (an average of $104 per week per participant).

Operational costs incurred by the educational institution can be highly flexible in such an institute, depending upon the amount of industrial education coursework in the curriculum. The two TAT institutes allotted approximately half the participants' time to industrial education work. Costs, primarily for staff, were $20,512 in 1966, or an average of $38 per week per participant. In 1967 additional time was devoted to planning and preparation, and operation of industrial education courses was substantially improved. Costs totaled $41,076, or $51 per week per participant, and included reproducing course materials developed by participants and mailing a complete set of 3,000 sheets to each person.

(Detailed cost breakdowns are contained in Tables 1 and 2.)

Evaluation Procedures

Among methods employed to analyze and evaluate the program during the two cycles, follow-up surveys of participants, critical analysis of the program by the staff, and reports of outside evaluators were the most helpful.

Entry, interim, and exit attitude scales and questionnaires to participants were of some value in judging opinions of classes at the particular moment and enabled the staff to make some immediate program adjustments. Interviews with counselors and other staff members provided data for similar purposes. However, none of these methods appeared to have high validity for long-term evaluation. For instance, surveys and interviews during the program operation nearly always revealed considerable sentiment for fewer technical lectures and less emphasis on industrial education courses. Yet follow-up questionnaires five to six months after the institutes revealed extremely high ratings for technical lectures and considerable praise for industrial education work.

Of all methods used, the post-institute questionnaire appeared to contain the most valuable information from which the staff could evaluate the program. The 160 participants were for the most part mature professionals who were candid in their observations and appeared able to judge the institutes both personally and professionally.

Analysis by staff members was helpful in making judgments about administrative and other operational matters, particuarly those involving a delineation of functions, responsibilities, or authority among the operating organizations. However, the staff tended to rely largely on direct or indirect reactions from the participants in reaching most decisions on program content.

External evaluations provided by panels of observers from industry, education, and government were especially helpful following the 1966 institute in making plans for 1967. The panel members achieved a consensus on a number of facets of the program which needed to be improved.

In 1967, however, there appeared to be little consensus among panelists on either findings or program recommendations.

The 1966 evaluation panel met on September 9, two weeks after the institute had closed. Panelists were Dr. B. E. Childers, director, Bureau of Adult, Vocational, and Library Programs, Atlanta, Georgia; C. M. Dunn, assistant commissioner for vocational-technical education, State of Tennessee; Dr. Carl Lamar, director, Kentucky Research Coordinating Unit, University of Kentucky; Dr. William G. Loomis, director, vocational education, State of Oregon; Dr. Byrl Shoemaker, head, Department of Vocational Education, State of Ohio; and Dr. Merle Strong, assistant director, program services, Division of Vocational and Technical Education, U. S. Office of Education. Panelists received complete sets of reports on the institute. They spent the day questioning members of the staff and several participants who had been asked back for the conference. Panelists were given a list of 10 topics on which the institute staff felt comments would be helpful, but they were invited to comment on any additional matters they thought pertinent. Individual written reports were requested within one month. (Reports in Appendix C.)

Generally, panelists agreed that the unique feature of the program was its use of industrial facilities and that this should be capitalized upon in every way possible. They suggested a number of changes in approach by both the University of Tennessee in its professional education courses and Union Carbide in its technical courses. They also indicated strongly that there should be more coordination and communication between those two aspects of the program.

The panelists recommended abandonment of the standard industrial

TABLE 1
In-Service Institute Costs
(First Cycle - 1966)

Item	ORAU	UCC	U.T.	Total
Personnel	$16,211	$ 7,877	$14,460	$ 38,548
Employee Benefits	1,758	1,165	505	3,428
Travel	619	---	439	1,058
Supplies and Materials	100	7,053	1,455	8,608
Other Direct Costs	3,080	4,000	234	7,314
Subtotal Direct Costs	$21,768	$20,095	$17,093	$ 58,956
Indirect Costs	3,404	600	3,418	7,422
Total Operating Expenses	$25,172	$20,695	$20,511	$ 66,378
Stipends	---	---	55,061	55,061
TOTAL COSTS	$25,172	$20,695	$75,572	$121,439

Average cost per participant per week $225 for 60 participants for nine weeks.

TABLE 2
In-Service Institute Costs
(Second Cycle - 1967)

Item	ORAU	UCC	U.T.	Total
Personnel	$ 16,676	$ 6,340	$ 25,194	$ 48,210
Employee Benefits	1,425	846	956	3,227
Travel	351	---	996	1,347
Supplies and Materials	3	13,950	5,605	19,558
Other Direct Costs	4,902	6,624	663	12,189
Subtotal Direct Costs	$ 23,357	$27,760	$ 33,414	$ 84,531
Indirect Costs	3,714	1,153	6,683	11,550
Total Operating Expense	$ 27,071	$28,913	$ 40,097	$ 96,081
Stipends	---	---	83,211	83,211
TOTAL COSTS	$ 27,071	$28,913	$123,308	$179,290

Average cost per participant per week $224 for 100 participants for eight weeks.

education courses in favor of newly developed courses designed to assist the participants in integrating new ideas and techniques into their teaching situations at home. They suggested that in technical content less emphasis be placed on lecture and observation and more on laboratory and shop experiences. They recommended improved procedures to recruit and select teachers with similar backgrounds and responsibilities. The panel also suggested that extensive orientation and counseling was unnecessary.

The 1967 panel met August 7 and 8, a few days before the close of the second institute. Panelists were: William R. Ramsay, director, Resource Development Project, Southern Regional Education Board; S. Walter Hixon, Jr., supervisory employee development specialist, NASA-Langley Research Center; R. H. Hudson, manager, Training Department, Lockheed-Georgia Company; William G. Loomis, director, vocational education, State of Oregon; H. D. Jared, coordinator of vocational high school programs, State of Tennessee; and W. A. Seeley, program officer, Division of Manpower Development and Training, Department of Health, Education, and Welfare, U. S. Office of Education, Atlanta.

In addition to viewing program materials and survey results and holding sessions with the participants and staff, the panelists spent several hours on August 7 observing the institute in operation.

In his report, Dr. Loomis, the only panelist returning from the previous year, stated that most of his criticismsof the first institute had been met, that he could see "definite evidence of program improvement," and that the "attitude on the part of the enrollees speaks for itself."

Several panelists offered suggestions on operations of any future programs based on the TAT approach. Included were recommendations that future institutes be shortened, with primary emphasis on technical work and provisions for industrial education work to be accomplished through the participant's home state. This suggestion was incorporated in part in the proposal for an on-going in-service institute at the Y-12 site which calls for institutes of three weeks' duration in-plant, plus pre- and post-institute correspondence work designed to assist participants in incorporating technical work into their teaching. (Reports, Appendix C.)

Follow-up surveys revealed that the overwhelming majority of participants in both the 1966 and 1967 institutes felt the experience had contributed to their career growth. The 1966 survey was conducted in January 1967 and the 1967 one in February 1968. A staff member also visited 18 1966 participants in December of that year and found that most had made wide use of the knowledge and materials gained at the institute.

The follow-up questionnaires asked participants for general comments on the program and invited them to rate the various segments on a five-point scale. Based on 89 questionnaires returned, the 1967 institute survey revealed that the following percentages of respondents rated the segments either "worthwhile" or "very worthwhile:"

Technical Lectures in the Appointed Areas	94 Per Cent
Development and Exchange of a Complete Set of Instructional Materials	89 Per Cent
Industrial Education Assignments, Including Notebooks, Revision of Course Outlines, Development of Transparency Originals	86 Per Cent
Guidance and Discussion Sessions	83 Per Cent
Seminars on Developments in Vocational Education	81 Per Cent
Field Trips to University Planning Center, Gaseous Diffusion Plant and National Laboratory	80 Per Cent
Laboratory or Shop Experiences	77 Per Cent
Technical Seminars for All Participants	72 Per Cent
Demonstrations and Workshops by Distributors and Manufacturers of Teaching Aid Equipment	68 Per Cent

Ninety-four per cent indicated that the institute definitely had contributed to their career growth and 98 per cent of those responding said they would encourage other teachers to attend such an institute. (Full summary of survey appears as Appendix D.)

CHAPTER 4

PRE-SERVICE INSTITUTES

For Charles C. Jones the prospect of leaving the Navy after more than 20 years presented some uncertainties.

Jones, 38, a chief petty officer, had enlisted at age 17 just out of Gatlinburg, Tennessee's Pi Beta Phi High School and had acquired a wide range of experience in the Navy. He had been a carpenter's mate for one year, a damage controlman for 12 years, and a utilities man for the last 7 years.

As a utilities man he was a specialist in air, oil, gas, and water distribution systems. His job encompassed pipefitting and metalworking skills.

His problem in the summer of 1966 as he considered his retirement scheduled for August 1967 was how to best fit these skills and experiences to a civilian career.

In the fall of 1966 he saw an advertisement in the Navy Times that suggested his service-acquired skills might qualify him for a program in Oak Ridge designed to prepare persons for careers in vocational and technical teaching. His subsequent application to the Training and Technology Project's Pre-Service Vocational-Technical Teacher Institute was accepted for the fall quarter of 1967.

Until seeing the advertisement, Jones had intended to continue his education in some way after retirement from the Navy, but he had not decided on a curriculum or school. The Pre-Service Institute offered him an ideal way to combine his service experience with his education to fit him for a career in which there was a critical shortage of practitioners.

The University of Tennessee, which had major responsibility for the pre-service program, awarded him 18 quarter hours of credit for his Navy experience and courses he had taken during his years in service. Three hours were given for a psychology course he had taken through American University, three hours for a utilities course given by the Navy, and 12 hours for his Navy experience in lieu of military science and physical education courses.

At the Pre-Service Institute he enrolled in the machining curriculum which provided him over the next three academic quarters with 12 quarter hours of industrially oriented experience in the machining of metals. He also took one course in welding for three hours. His instructors were experienced machining and welding personnel of Union Carbide Corporation, Nuclear Division.

He also acquired 33 hours of credit in general education and industrial education courses taught by regular faculty members of the University of Tennessee and another six hours of credit in directed teaching by conducting a class in blueprint reading for welding trainees in the Training and Technology Project's worker training program.

By June 1968 Jones had acquired through the institute 54 quarter hours of credit which, added to the credit allowed for his service courses and experience, gave him a total of 72 quarter hours. He was certifiable as a vocational teacher in Tennessee and hoped to get a job in a vocational school in East Tennessee.

He also placed an application with Union Carbide Corporation in Oak Ridge and was employed in September 1968 by the Y-12 Planning and Estimating Department and assigned as a full-time instructor in general mechanics in the Training and Technology Project's worker training program.

Jones plans to continue work toward his degree in industrial education through evening courses.

Harley Orange has been a machinist for 28 years, 20 of them at the Y-12 Plant. His rating at Y-12 is "experimental machinist," the equivalent of tool and die maker.

Over the years, Orange has been associated at various times with the apprenticeship program at Y-12 and as a result became concerned with the need for additional qualified teachers to instruct young people. He had no idea that he might make the transition to vocational school teacher, although he did take the two public speaking courses through the University of Tennessee extension service in an effort to better fit himself for teaching in the apprenticeship program.

In 1966, Orange was assigned as a production machinist to the machine shop of the Training and Technology Project. Although most of his time was taken up with regular production work, about one-fourth was involved in instructing and evaluating trainees in the TAT worker training program. In the fall of that year, he learned that University of Tennessee industrial education courses would be available through TAT's Pre-Service Vocational-Technical Teacher Institute, and he enrolled for 12 quarter hours of work. For the next two academic years, Orange took 9 to 12 hours of work each quarter, mostly through the institute but sometimes supplemented by courses on the main University of Tennessee campus.

At the institute, he was able to acquire numerous credits in industrial education methodology and theory, taught by University of Tennessee faculty members, and was able to broaden his technical background with such courses as Industrial Mechanical Drafting, Welding, and Numerical Control, taught by Union Carbide personnel.

By June 1968, Orange had acquired 99 quarter hours of credit toward his B. S. degree in industrial education, including 27 hours he received after taking the Industrial Education Department's machining proficiency examination. He plans to continue toward his degree and definitely plans to enter full-time teaching. "It may be tomorrow or it may be five years from now, but I'm going to teach," he says. In five more years, he will have reached age 55 with 25 years service and will be eligible to draw a pension. He says he possibly will wait until then before quitting Y-12 to enter full-time teaching. In the meantime he hopes to teach in night school.

As a result of his enrollment in the Pre-Service Institute, Orange received a promotion to tool coordinator in the summer of 1968. He serves as a link between the engineering design department, the machine shops, and the "customer." His three courses in mechanical drafting and his directed teaching in mathematics were key factors in obtaining the job.

Orange and Jones typify two types of students attracted by the TAT Pre-Service Institute. Both were mature men with vast experience that would be useful in the classroom or shop, but both had special needs to be met before they could begin teaching. Both also had to be made aware that it was possible for them to become teachers.

Jones, who had acquired his technical background in the Navy, needed to relate it to current industrial technology. The institute enabled him to do so, while also providing credits in professional industrial education methodology and theory. Orange needed to broaden his technical background somewhat in related areas such as mechanical drafting (including numerical control programming) and welding. But to do so he needed a preparatory program that would fit in with his schedule. This was complicated by the fact that he was on shift work and the shifts alternated weekly. In some cases, therefore, class hours were arranged to fit his schedule.

Recruitment

The experience gained in two cycles of the Pre-Service Institute revealed a number of approaches to the complex problem of attracting qualified persons into vocational and technical teaching. The matter of maintaining a substantial income while undergoing the preparatory phase is paramount to most persons who would qualify. Therefore, special efforts need to be put forth to recruit persons who have some income, either from a full-time job or through an outside source. In the former case, the program schedule must lend itself to attendance by persons employed full time.

A goal of 30 full-time day students had been set for the first academic year institute scheduled to operate from September 1966 to June 1967. An early draft of the project proposal had included stipends for pre-service teachers, but this provision had to be deleted for policy reasons related to precedent and shortage of funds. There were some expectations that pending legislation would enable the payment of stipends. As the time for the institute approached, however, this legislation had not been approved and it was decided to proceed with the experiment and explore a variety of recruitment methods, including support for participants through other sources. Investigation into the possibility of grants or scholarships was pursued with industrial and business organizations, labor organizations, state departments of industrial education, and the Ford Foundation. None of the investigations seeking stipend support were successful, however.

A three-month recruitment drive in the summer of 1966 concentrated on attracting presently enrolled students from across the country to attend the institute for one academic year. Six persons enrolled for coursework ranging from 12 to 18 quarter hours. Two were full-time Union Carbide employees enrolled for 12 hours each, one transferred from the main campus of the University of Tennessee, one transferred from Tennessee Tech, and two others left jobs to enroll. A total of 35 persons had inquired about the program, but most could not meet the trade experience requirements.

A reassessment of the program and recruitment goals resulted in two major changes in direction for the winter quarter: (1) recruitment would concentrate principally on recently retired or discharged military personnel, and (2) some classes would be changed to early evening and advertised to craftsmen in the area. In addition, a decision was made to encourage any of the 173 TAT worker trainees with a year's related work experience to attend if they met regular University of Tennessee entrance qualifications.

Emphasis was to be put on veterans because:

- Thousands of those regularly discharged or retired from the services are seeking new careers and thus provide an accessible pool of potential students;
- Many have acquired technical skills while in service that qualify them for entry into the institute; and
- GI benefits or retirement pay provide veterans with the necessary financial assistance.

Advertisements were placed in the major armed forces newspapers and more than 300 news releases and brochures were sent to post publications, magazines for retired servicemen, and to general education development directors of the Army and Air Force. The Peace Corps and the Education Service Bureau also were sent releases and brochures. The news releases were reprinted widely.

By December 1966, inquiries had been received from 192 persons, approximately 25 of whom subsequently completed and returned applications. Three of the applicants were accepted for the winter quarter and the remainder, most of whom had not yet left service, were held for consideration for the 1967-68 institute.

Three additional Union Carbide employees enrolled in the winter quarter for 12 hours of credit, five others enrolled as part-time students for the evening courses, and two teachers in area vocational programs enrolled for evening courses. Six trainees under the Manpower Development and Training Act enrolled for 12 hours of credit, thus acquiring "full-time" status in the institute, and another 14 trainees enrolled in evening courses as part-time students.

Thus, by January 1967, full- and part-time enrollments each stood at 16, for a total of 32 students. No new recruitment efforts were undertaken for the spring quarter and by its close in June enrollment stood at 10 full- and 9 part-time students. The six full-time students who withdrew did so for reasons such as family problems, business responsibilities out of state, physicians's advise, or too heavy a work load as both students and workers.

In the meantime, additional inquiries about enrollment in the 1967-68 Institute had been received as a result of the publicity in the fall of 1966 and new publicity in the spring of 1967. By late summer 1967, a total of 571 inquiries had been received over the two cycles. Forty-five persons had completed and returned applications for the 1967-68 cycles, 38 of whom were accepted.

Twenty-five were enrolled on September 18, but one withdrew in a few days for medical reasons. Of the 24 new enrollees, all were former military personnel, 23 of whom qualified for financial assistance through GI benefits or retirement pay.

In addition, one Union Carbide employee enrolled full time and six others as part-time students, bringing the total for the 1967 fall quarter to 31 students.

During the year, one full-time participant obtained a teaching job at an area vocational school in Tennessee and four withdrew for personal reasons after acquiring one or two quarters of credit. By the end of the academic year in June, 19 of the ex-military personnel remained as full-time students. Union Carbide employees enrolled full time in the Institute varied between one and four per quarter, depending on whether the person was taking 12 quarter hours. In all, 15 Union Carbide employees were enrolled in one or more courses during the Institute year. As in the 1966-67 Institute, several courses were held in late afternoon and early evening to accommodate employees in area industries. (See Appendix E, Summary of Personal Data, 1967-68 Pre-Service Institute Students.)

The Curriculum and Instructional Program

The curriculum was developed with several goals in mind. First, it was intended as a balanced selection of offerings in both technical and professional areas so that participants for the full academic year would have a solid base upon which to enter teaching. Second, it was designed to fil into the degree program of the University, to accommodate participants aiming directly for the B. S. degree in industrial education. It was devised with considerable flexibility, particularly in technical courses, in an effort to serve the highly diverse needs of the students.

Courses offered by the Institute (See Table 3) included three in general education, one in educational psychology, 11 in industrial education theory and methods, and 12 in the technical areas which encompassed machining, mechanical technology and drafting, welding, physical testing, and industrial electronics. (Sequences of courses, such as Machining of Metals 3080-81-82, which is conducted over three quarters for 9 hours of credit, are included in the above figures as single courses.)

The technical courses were divided into specialty and nonspeciality courses. Specialty courses included concentrated technical theory and laboratory or shop experiences in the student's technical area of appointment. The courses were taught by experienced Union Carbide Corporation personnel. Nonspecialty courses covered the same technical areas but were intended as "survey" courses to broaden the technical background of students in other specialties. These courses were conducted under direction of University of Tennessee faculty members, with much of the instruction performed by institute students specializing in these areas. (In several cases the students were also Carbide employees.) Directed teaching credit was given to the student teachers.

The professional industrial education courses, such as History and Philosophy of Industrial Education, Methods of Teaching Shop and Related Subjects, and Job Analysis were essentially identical to courses offered on the main campus and extension classes throughout the state. Flexibility was added to professional courses by including in the curriculum courses entitled "Basic Experiences in Trade and Industrial Education" and "Problems in Industrial Education." Both could be tailored to the specific needs of each student. Directed teaching courses were a unique feature of the program, allowing the students to obtain six to nine hours of credit for classroom or shop instruction of (in most cases) trainees in the TAT worker training program.

A course, Educational Psychology: Adolescence, was taught by the TAT guidance and counseling coordinator who was also a member of the faculty of the Educational Psychology Department of the University. Because the institute was being conducted jointly with the TAT worker training program, the course utilized the worker training program as a laboratory for case studies of typical vocational students.

Three general education courses were offered to assist in meeting degree requirements and further broaden the curriculum.

The full-time University of Tennessee staff at the TAT facilities included the institute director, Dr. Maurer, and one industrial education instructor. Another instructor devoted part time to the institute and the remainder to the worker training program. The general education courses were taught by faculty members from the main campus.

The institute concept of conducting teacher training in an industrial setting utilizing employees of Union Carbide Corporation necessitated approval for a number of courses by the University of Tennessee Senate. The new courses requiring approval included 27 hours of undergraduate offerings in each of the institute's five technical areas, plus nine hours in numerical control and directed teaching. (Similar approval also was required for the courses offered in the second In-Service Institute.)

Temporary approval of the courses was granted by the College of

TABLE 3
Pre-Service Institute
Courses Presented In 1966-67 and 1967-68*

Education Courses

Course Number	
3010	History and Philosophy of Education
3020	Principles and Organization of Education
3030	Social Foundations and Curriculum
3810	Educational Psychology: Adolescent
2010-20-30	Basic Experiences in Trade and Industrial Education
3010	Related Science, Mathematics and Technology in Occupations
3020	Manipulative Skills in Occupations
3030	Knowledge of Related Subjects in Occupations
3110	History and Philosophy of Industrial Education
3310	Shop Organization and Management
3320	Materials and Methods for Teaching Shop and Related Subjects
4110	Foremanship Training by the Conference Method
4120	Job Analysis
4210	Methods of Teaching Shop and Related Subjects
4310	Curriculum Building in Trade and Industrial Subjects
4350-60-70	Problems in Industrial Education
4410-20	Directed Teaching

Technical Courses

3040-41-42	Physical Testing Technology
3050-51	Welding, Brazing, Cutting and Related Processes
3060-61-62	Electronics Technology
3070-71-72	Industrial Mechanical Technology
3080-81-82	Machining of Metals
4060-61-62	Industrial Mechanical Instrumentation
4080-81	Industrial Materials, Processes and Fabrication of Metals
4090	Numerical Control

* See Appendix F for Individual Course Descriptions

Education in the fall of 1966 so that the Institute could get under way. By the end of December formal approval had been granted by the College of Education and the Curriculum Subcommittee of the University Senate. Full Senate approval was given by April 1967. (A listing of courses approved by the Senate is included as Appendix H.)

Ex-Military Personnel: Qualifications and Needs

Recruitment of newly retired and discharged servicement, undertaken out of necessity to find students with a means of support, provided the Institute with an enrollment of exceptionally able and qualified men, rich in resources for teaching.

The typical ex-military enrollee had more than 20 years of military service, 13 of which were spent in technical work directly related to his area of enrollment. While three of the enrollees had undergone apprenticeship programs and achieved journeyman status as civilians, the remainder had acquired nearly all their formal training and most of their experience in the service. About half were reasonably up-to-date in the skills in their fields, although in many cases these skills were directed toward military equipment. The other half had moved into administrative and supervisory work in recent years and needed considerable updating in manipulative skills and some updating in technical theory.

A majority needed experience with modern industrial equipment and personnel to top off their service backgrounds.

Many had acquired teaching experience while in service. A survey of the 19 who completed the Institute in June 1968 indicated that 14 had an average of 5.4 years of teaching experience. In connection with this experience they had taken courses in visual aids, curriculum development, or job analysis. Many of the courses, however, were not suited to their new careers as vocational teachers. In addition, nearly all needed a course in the history and philosophy of industrial education and in adolescent psychology.

Fifteen of the 19 ex-military men had acquired an average of 75 quarter hours of college work during and prior to their military service. Three of the 15 held baccalaureate degrees—in liberal arts, history, and general education.

Their military ranks ranged up to lieutenant colonel.

Even with these backgrounds, the enrollees were relatively young and could look forward to an everage of more than 20 years of active teaching.

Three of the ex-military men acquired sufficient hours to receive their B. S. degrees in industrial education from the University on June 6, 1968. Ten others are scheduled to receive their degrees over the next four quarters. The majority plan to continue full time for their degrees before entering teaching.

Five participants who will receive their degrees by the fall of 1968 have been granted two-year industrial education fellowships carrying $2,000 the first year and $2,200 the second year, plus dependency allowances, for graduate studies. Four of the fellowships were granted by the University of Tennessee, which will include experience in TAT Phase II, and one by the University of Missouri.

Industrial Employees: Qualifications and Needs

Industrial employees have been a traditional source of vocational teachers. Except for one brief article in the Oak Ridge newspaper in December 1966, no special effort was made by the Institute to recruit students, full or part time, from local industries. However, the fact that the program operated in the Y-12 Plant made it known among plant employees and, by the second cycle, 15 enrolled for courses. Four maintained rather steady schedules of 9 to 12 hours per quarter. Eight of the 15 Carbide employees first became associated with the Institute through assignment by Carbide to the TAT worker training program. The 15 who enrolled in the Institute had an average of 12 years of experience in their trade areas.

Counseling interviews revealed essentially three reasons for the employees to enroll in the institute.

First, there were employees who were not satisfied with their production-type jobs and wanted to change, even at the loss of some income. At least two of the 15 were in this category. One has since entered full-time teaching and the other has quit full-time employment to pursue his degree at the main University of Tennessee campus.

Second, there are employees who find teaching attractive as a second occupation, either full or part time. They are not dissatisfied with their present jobs, but feel teaching offers them a means of some satisfactions they cannot obtain in production work. They hope to teach in night school or after early retirement. If an especially attractive teaching offer should present itself, they would consider giving up their regular jobs now. Seven of the 15 Carbide employees enrolled were in this category.

The third type of student is the one who has no plans to leave industrial employment but sees the Institute as a means of supplementing his income by part-time teaching or as a way to upgrade himself in his job. Six of the 15 were in this category.

The 15 Carbide employees enrolled part time in the second cycle previously had acquired an average of about 60 quarter hours of college credit. They acquired an average of 25.4 additional hours through the Pre-Service Institute. Eleven expect to have their B. S. degrees in industrial education by the spring of 1973.

Until they heard of the Institute, most were unaware of any specific programs or ways to enter vocational teaching. Had the program been actively promoted among industrial employees in East Tennessee and the schedule been made to conform more nearly to the off hours of workers, many more craftsmen probably would have enrolled.

The worker trainees who enrolled in the program were not qualified by their trade experience to enter regular vocational teaching jobs immediately upon completion of TAT. However, one machining trainees became a teacher in a special program for the disadvantaged immediately after completion, and another is enrolled in an industrial education curriculum in Arizona while gaining machining experience through a full-time job.

Costs

The Pre-Service Institute was tuition-free to participants, but no stipends were paid to students.

As with the In-Service Institute, most of the costs to Oak Ridge Associated Universities were in connection with establishing and managing the experimental program and should not be considered in any replication plan.

Excluding ORAU costs, the total cost of the second cycle of operation was $65,357 or $43 per quarter hour of credit awarded. Of this total, the cost of the industrial (Union Carbide) involvement was $20,219 or $13 per quarter hour of credit. (Additional cost information contained in Tables 4 and 5.)

Evaluation Procedures

The Pre-Service Institutes were evaluated almost exclusively by internal procedures, utilizing staff analysis and participant reactions extensively.

At the conclusion of the second institute, participants were asked to complete two lengthy questionnaires. One was designed primarily to gather personal information, although it contained some evaluative questions (see Appendix E). The other, called a "Content Survey," was designed to solicit comments and ratings by participants on the program and its various segments (see Appendix G).

Of 42 course offerings evaluated by students (each part of sequential courses was evaluated), the average of group ratings all were in the "very worthwhile" and "worthwhile" categories. No course received a group rating of "moderately worthwhile," "little value," or "no value." Most comments about courses were favorable and eleven received a perfect rating.

TABLE 4
Pre-Service Institute Costs
(First Cycle - 1966-67)

Item	ORAU	UCC	U.T.	Total
Personnel	$14,319	$ 5,977	$19,657	$39,953
Employee Benefits	1,386	859	1,319	3,564
Travel	490	---	1,112	1,602
Supplies and Materials	131	936	933	2,000
Other Direct Costs	29	4,344	395	4,768
Subtotal Direct Costs	$16,355	$12,116	$23,416	$51,887
Indirect Costs	2,587	884	4,683	8,154
TOTAL COSTS	$18,942	$13,000	$28,099	$60,041

Average cost per quarter for average number of students (19) enrolled was $1,053.

TABLE 5
Pre-Service Institute Costs
(Second Cycle - 1967-68)

Item	ORAU	UCC	U.T.	Total
Personnel	$21,796	$ 7,432	$32,722	$61,950
Employee Benefits	2,544	1,020	1,533	5,097
Travel	---	---	1,357	1,357
Supplies and Materials	33	2,380	2,669	5,082
Other Direct Costs	33	8,480	1,026	9,539
Subtotal Direct Costs	$24,406	$19,312	$39,307	$83,025
Indirect Costs	3,826	907	7,861	12,594
TOTAL COSTS	$28,232	$20,219	$47,168	$95,619

Average cost per quarter for average number of students (31) enrolled was $1,028.

CHAPTER 5

RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

In two years of operation, the Vocational-Technical Teacher Institute accumulated ample evidence that industry and education can and should join in programs to prepare and update teachers. Not only does this cooperative approach provide programs that are more responsive to needs of teachers in today's advancing technology, but both the industry and educational institution find new and more effective ways to utilize their own resources in the process. Thus, the combination results in more than simply the sum of the two parts.

Through the program, Y-12 management discovered valuable resources in personnel, materials, or equipment that were not being utilized to their fullest or were going virtually unnoticed. The institute provided Y-12 with a new evaluation of its in-plant training resources, including hundreds of technical reports on file in the technical library, and it provided new insights into methods of in-plant training. Perhaps the most important benefit to Union Carbide and Y-12 was the development of technical and supervisory personnel assigned to teaching or other roles in the institute. A number of employees were moved into new positions of responsibility in the plant after being associated with the institute.

The University of Tennessee's Department of Industrial Education, through the opportunity to conduct a program within the gates of one of Tennessee's largest and most advanced industrial plants, achieved a form of in-service training for its faculty in the methods, capabilities, and problems of a major area industry. This experience could not have been matched through any less direct association.

The institutes brought about a recognition by the University that it has a responsibility beyond the professional preparation of vocational and technical teachers. Action by the University Senate approving the addition of a large group of technical courses to the permanent industrial education curriculum is formal recognition of a responsibility for technical preparation of teachers. The need for universities to exercise this responsibility is becoming more urgent in the face of rapidly advancing industrial technology.

The institute provided a major spinoff benefit to the federal government in offering a new dimension in efforts to encourage multipurpose use of government facilities. It represented the first significant use of the Y-12 Plant for purposes of direct human resource development.

A Viable Combination

Although industry and educational institutions approach training from different directions, the institute and the proposals which grew out of it demonstrated that the organizations can operate joint programs which incorporate and retain both points of view.

Educational institutions are oriented largely toward method and process, while industry emphasizes production and standards. In the TAT program neither organization ever gave up its basic approach, a major source of strength to the combination. The ideas of each organization were sharpened by competition with the ideas of the other. The built-in ability of industry to change rapidly to meet new conditions contributed to the experimental aspects of the program and to operational flexibility.

Oak Ridge Associated Universities assumed much of the institute management responsibility at the outset, but the University of Tennessee began early to take on a major role and by the end of the second cycle the University exercised almost full operational responsibility in cooperation with Union Carbide.

A New Relationship

The most significant result of the Vocational-Technical Teacher Institute was the beginning of a new relationship between the area's largest industrial employer and the industrial education department of the state's land grant university.

Prior to the establishment of the institute there was little formal or informal contact between the two organizations about common problems of manpower training and teacher preparation. The relationship formed through TAT not only encompassed the two organizations, but extended to other concerned agencies and groups, including the Tennessee Division of Vocational-Technical Education, the Tennessee Department of Employment Security, and various labor organizations.

New relationships extend beyond those outlined in various proposals and agreements. The personal contacts developed by employees at all levels of the organizations provided possibly the strongest linkages.

Applying the Concept to In-Service Training

The overwhelming majority of participants in both the 1966 and 1967 In-Service Institutes rated the program highly from the standpoint of both immediate classroom application and long-range career plans.

It provided a much more effective means of updating teachers in technology than the requirement that each teacher must "return to industry" periodically through a summer job. Many such experiences merely make use of the teacher's existing skills rather than providing the teacher with new skills or technical knowledge.

The presentation of industrial education methodology and theory courses as part of the institute met a need of many of the teachers who had entered careers with little or no professional foundation. The combination of these courses with the technical courses presented a compact, well integrated experience responsive to the participants' needs. Follow-up surveys indicated the participants felt the professional work, particularly that designed to incorporate the technical information into lesson plans, was a valuable requirement of the institute. The professional courses were, in fact, essential to an experiment designed to demonstrate the value of a combination of educational and industrial resources.

However, modifications of the institute's format in other programs are entirely possible and probably desirable to fit various capabilities and needs.

Financial support of some type for participants is essential for a successful program. Stipends similar to those paid in the TAT institutes are one answer. Other possibilities include agreements whereby the state vocational education departments participating in the institutes continue the salaries and pay travel and subsistence expenses of their teachers who attend. Fellowships and scholarships through various sources also could be investigated.

The Oak Ridge program costs, when analyzed, appear to support the feasibility of the concept of the industry-education combination. A full program on the scale of that in Oak Ridge may be possible only through the participation of a number of states. However, various portions or modifications of the concept seem feasible on a smaller scale. The figure of $36 to $39 per participant per week for industrial participation would appear to be within reason.

Some operating observations from the two cycles of the institute were:

- Specific target groups of participants should be identified and recruitment should concentrate on filling the enrollment from these homogeneous groups.
- Once the institute opens, no time should be lost in starting coursework. A day or two of orientation is sufficient.
- An institute announced as providing updating and upgrading experiences should do so. Participants will react quickly to experiences which they can receive on any college campus or through a talk with any industrial public relations man. Course materials and subject matter must constantly be evaluated for freshness and relevance to vocational-technical teachers.
- Significant segments of the curriculum should be devoted to technical theory. Although the staff should constantly be alert to applications and demonstrations of the theory, it should resist repeated requests from participants for excessive "hands-on" experience.

Applications of Concept to Teacher Preparation

The industrial setting adds a new dimension to traditional methods of preparing persons for vocational and technical teaching. To achieve their greatest potential and economy, industrially oriented programs must be coupled with a strong recruitment effort, including a search for new sources of prospective teachers. The programs also must be responsive through scheduling and content to the special requirements of those persons recruited for vocational teaching jobs.

The TAT institutes were able to identify military veterans and retirees as a significant source of vocational and technical teachers. Recruitment for military men, it was discovered, ideally should begin 8 to 12 months before their separation from service, since most begin making firm plans for second careers at least this far in advance.

The retiring career serviceman usually has a strong background in his technical specialty but often needs updating and an orientation toward industrial applications.

The Pre-Service Institute concept proved to be an effective way of updating and refocusing his skills while also providing him with the necessary professional coursework in theory and methodology.

Recruitment of retiring or discharged military personnel provides a pool of persons who have reached a natural breaking point in their careers. TAT experience shows that they quickly become committed to their second career in teaching. Of the 19 ex-military persons who completed the program, all are expected to enter full-time teaching careers and one entered teaching before completion. Of the four who dropped out for medical or personal reasons, it appears quite likely that at least two will enter teaching. Thus, recruitment of ex-military personnel holds to a minimum the exploratory type of participation in such programs by persons still established in full-time careers.

The Pre-Service Institute demonstrated that substantial numbers of qualified persons in industry would be interested in changing to vocational teaching careers if they were aware that the possibility existed and if more preparatory programs were available at convenient times and locations. While the percentage who eventually will enter full-time teaching careers probably is not as large as that among the ex-military personnel, many are likely to engage in part-time teaching.

Preparatory programs in an industrial setting provide a means of broadening the technical background of these individuals. For most economical operation, however, major emphasis probably should be on attracting full-time students such as ex-servicemen, while adjusting schedules to allow industrial employees to attend at least some classes.

Association with Manpower Project

The fact that the Pre-Service and In-Service Institutes operated in conjunction with a comprehensive manpower training and development program contributed significantly to the success of the institutes. The TAT approach resulted in the availability of larger facilities and more staff and training resources from industry and other organizations that would have been possible if the institutes operated alone. Additional personnel provided a broader exchange and helpful competition of ideas and knowledge.

The manpower training program also served as an ideal laboratory for the teachers. They were exposed to both the typical vocational student and the "disadvantaged" student. Pre-Service Institute participants had an opportunity to do practice teaching in shop and related subjects with classes of MDTA trainees. Guidance seminars and courses utilized the MDTA program extensively as a laboratory.

Program Development and Replication

As a result of the Vocational-Technical Teacher Institute experience, similar activities have been undertaken or are proposed at Oak Ridge and elsewhere in the Southeast.

The most comprehensive proposal was submitted to the U. S. Office of Education by the University of Tennessee in cooperation with Union Carbide Corporation, Nuclear Division, the Tennessee State Division of Vocational-Technical Education, and the division of vocational education in nine other Southeastern states. The project has been approved and will operate in association with the Training and Technology Project.

The proposal calls for a five-year continuation in modified form of both the In-Service and Pre-Service Institutes at the Y-12 Plant. It will (1) recruit and train as teachers retired and discharged military personnel and presently employed industrial workers, and (2) continue the upgrading and updating of experienced teachers through a series of three-week institutes.

The program is designed to provide fullest utilization of the TAT training concept, by combining the human and capital resources of industry with university training and state involvement.

A meeting to plan and discuss major portions of the proposal was held on February 15, 1968, at offices of the Southern Regional Education Board in Atlanta. Attending were representatives of vocational education departments of six states—Florida, Georgia, Mississippi, South Carolina, Tennessee, and Virginia. Directors of vocational education in West Virginia, Alabama, North Carolina, and Kentucky were unable to attend but have indicated an interest in cooperating in the program.

In addition to the vocational education representatives, the meeting was attended by representatives of Lockheed-Georgia, the National Aeronautics and Space Administration, Oak Ridge Associated Universities, the Southern Regional Education Board, Union Carbide Corporation, Nuclear Division, University of Tennessee, and U. S. Office of Education.

Two organizations represented at the meeting also have begun small in-service programs in other localities of the Southeast and have plans for expanded programs in 1969.

The Langley Research Center of the National Aeronautics and Space Administration at Hampton, Virginia, in cooperation with Old Dominion College, conducted a six-week summer in-service teacher program in 1968 for 22 vocational teachers from all sections of Virginia.

The program offered work in four areas—woodworking, metalworking, machining, and electronics. Each participant spent two hours per day in school and worked five hours a day in Langley shops and laboratories alongside regular employees. In addition to the academic instructional program conducted by faculty members from Old Dominion College, one-hour seminars were conducted twice a week by 12 specialists from the Langley Research Center. Additional industrial orientation and updating was provided through tours of nearby shipbuilding facilities and other installations in the Norfolk-Newport News-Hampton area.

The overall program was supported by the regular operations of the Langley Research Center. The Industrial Education Service of the State of Virginia paid each participant a lump-sum stipend of $120. Students in turn paid $84 each for the six-semester-hour credit program conducted by Old Dominion College.

The program's success has resulted in plans to expand it in the summer of 1969 to 40 vocational teachers from throughout the Southeast. A proposal for federal support has been submitted by Old Dominion College.

Lockheed-Georgia Company conducted a program in the summer of 1968 in cooperation with the State Department of Education. Lockheed specialists taught a 52-hour course in transistor circuit analysis to 17 Georgia vocational and technical teachers. It was slanted toward the latest developments and trends in solid-state technology.

A course in numerical control programming is planned in early 1969 for teachers in mechanical technology and drafting. It will be conducted one weekend per month for five months.

A proposal is being developed for a larger in-service training program in cooperation with the University of Georgia. Under the plan, vocational-technical teachers would spend full time for a number of weeks in Lockheed and perhaps other industries. They would be on the payroll of the Georgia Department of Education. Their time would be programmed into designated periods for observation of specific areas of the industry pertinent to their particular fields. The program also would include lectures and an opportunity for teachers to work alongside regular Lockheed employees. Some classroom work also may be included.

Problem Areas

The Vocational-Technical Teacher Institute represents for vocational educators a marked change from established teacher training programs, and for industrial personnel it means a drastic change in job orientation. In the formative stages of the program, constant attention had to be given to assisting these persons to overcome their resistance to the change necessitated by the institute. Oak Ridge Associated Universities functioned in this role. Both vocational education and industry are steeped in long-established ideas and practices which in many instances had no applicability to the concepts of the program.

Initially, there was a lack of appreciation among many of the industrial staff for the principles and techniques of teaching. However, industrial instructors learned by experience that a thorough working knowledge of a technical area does not necessarily prepare a person to teach it.

A brief orientation to teaching methods was provided to the Carbide instructional staff by University of Tennessee faculty members, but additional work would have been desirable. Instructors often gave insufficient attention at the beginning to such details as the noise level in a shop area during demonstrations, how to stand and speak to best be heard during a demonstration, how to write on a blackboard and be heard simultaneously, and how to use visual aids effectively.

The previously cited conflict between participants and faculty on the amount of "hands-on" shop and laboratory work in the institute was to some extent the result of a lack of appreciation by industry of the value of these practical applications to the learning process. Participants, on the other hand, probably overemphasized their value.

Production priorities were cited by several evaluators as a danger to effective operation of such institutes. Some problems in this area were encountered by the TAT program.

Y-12 production operations possibly prevented the institutes from obtaining the services of a few highly qualified technical personnel who could have contributed to the program. The demands of production work may have limited the attention some part-time instructors were able to devote to preparation. Production limited, and in some cases prevented, the use of equipment for demonstration or practice. But in many instances, when equipment was unavailable, detailed drawings and slides were obtained from the Y-12 technical library. On the other hand lack of time prevented the use of other resources that were available for instructional purposes.

Most of the participants in the program felt production priorities did not present a severe obstacle to the effectiveness of the institute.

Areas for Follow-Up

Follow-up work that needs to be done includes further identification of the uses of technology in education, additional development of a methodology of extending programs to other areas, and investigation of the effect of stipends on recruitment for prospective vocational-technical teachers.

Although TAT was immersed in an advanced, expanding technology of great value to project training for more than two years, there was only a promising beginning made in determining how best to define and achieve its optimum utilization for instructional purposes in short-term programs. Many exciting and worthwhile possibilities remain for further experimentation and research in this area.

More conferences of state vocational education departments, universities, and industries are needed to explore extension of the TAT "combination of resources" concept and approach. Although one such conference was held in February 1968, the necessity for regional approaches to the problems of vocational teacher preparation make follow-up meetings essential. Other avenues of program development also should be sought through face-to-face contact between program development staff and state operating personnel of the region.

Much of the TAT Pre-Service Institute experience was concerned with how to recruit and prepare persons for teaching without the incentive of stipends. A program exploring the use of stipends also would be helpful in determining whether stipends would provide an effective tool in recruitment of sufficient numbers of qualified people; whether the amount of a stipend in a program that seeks to entice persons from well-paying jobs would be justified; and whether scholarships and grants from foundations, business or labor organizations would be a feasible alternative or supplement to a stipend and serve to increase the number entering this vocation.

Finally, TAT worker training programs have accumulated a significant body of valuable information and experience in training the disadvantaged. This needs to be organized and prepared in a form suitable for instructing vocational and technical teachers in methods and techniques of such instruction.

NOTE: Publications listed here are available in limited quantity from the Training and Technology Project, Oak Ridge Associated Universities, P. O. Box 117, Oak Ridge, Tennessee 37830

TAT PUBLICATIONS
ON
VOCATIONAL-TECHNICAL TEACHER INSTITUTE

Code Title of Publication

FD1 - - - - - 1966 In-Service Teacher Recruitment Report
FD2 - - - - - Orientation Summary, 1966 In-Service Teacher Institute
FD6 - - - - - Mid-Term Curriculum Survey, 1966 In-Service Institute
FD7 - - - - - Third Week Attitude Survey, 1966 In-Service Institute (Abstract FD7a)
FD8a - - - - Summary of In-Service Institute Exit Questionnaire Results, 1966 (Part I)
FD8b - - - - Summary of In-Service Institute Exit Questionnaire Results, 1966 (Part II)
MFD1 - - - - Semi-Final Report, 1966 In-Service Teacher Institute
FD13 - - - - Evaluation Panel, 1966 In-Service Teacher Institute
FD26 - - - - Follow-up Field Visits to 1966 In-Service Institute Participants
FD27 - - - - Follow-up Survey, 1966 In-Service Institute Participants
FD31 - - - - Course Outlines, 1967 In-Service Institute
FD32 - - - - Guidance and Counseling Plan, 1967 In-Service Institute
FD44 - - - - Recruitment, 1967 In-Service Institute
FD41 - - - - Entry Survey, 1967 In-Service Institute
FD42 - - - - Exit Survey, 1967 In-Service Institute
FD54 - - - - Follow-up Survey, 1967 In-Service Institute
FD51 - - - - Content (Exit) Survey, 1967-68 Pre-Service Institute
FD55 - - - - Summary of Personal Data, 1967-68 Pre-Service Institute Participants
SP20 - - - - Upgrading and Retraining Vocational-Technical Teachers
SP7 - - - - - Quarterly Report to U. S. Office of Education, July 1 - September 30, 1966
SP13 - - - - Quarterly Report to U. S. Office of Education, October 1 - December 31, 1966
SP15 - - - - Quarterly Report to U. S. Office of Education, January 1 - March 31, 1967
SP18 - - - - Quarterly Report to U. S. Office of Education, April 1 - June 30, 1967
SP21 - - - - Quarterly Report to U. S. Office of Education, July 1 - September 30, 1967
SP25 - - - - Quarterly Report to U. S. Office of Education, October 1 - December 31, 1967
SP27 - - - - Quarterly Report to U. S. Office of Education, January 1 - March 31, 1968
SP30 - - - - Quarterly Report to U. S. Office of Education, April 1 - June 30, 1968

Related Publications

Training and Technology Training Catalog, 1966-1967-1968
Summary Report of School-Industry Conference, July 11-12, 1967
Visitation Program Report of Training and Technology Project, September 1967 - January 1968

Appendix A

Course Outlines

1966 and 1967 In-Service Institutes

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  Industrial Electronics Technology and Maintenance. . . A-13

  Machine Shop and Fabrication A-17

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  Machine Shop and Fabrication A-37

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SEMINAR SCHEDULE   Report No. Y-EG-2

1966 VOCATIONAL-TECHNICAL IN-SERVICE TEACHER TRAINING INSTITUTE

Cafeteria Conference Room   Building 9711-5

12:00 Noon - 1:00 PM

Coordinator - Ralph Pearson

July 4, 1966	Holiday
July 5	The Necessity of Standards and their Relationship to Industry - J. Ellis, R. Alexander
July 6	The Necessity of Standards and their Relationship to Industry - J. Ellis, R. Alexander
July 7	Application of Small Computers to Process Control - W. Lee
July 8	Class Make-up
July 11, 1966	ORNL Demonstration Tour
July 12	Optical Applications in Dimensional Gaging - L. G. Whitten
July 13	Design and Construction of Semi- and Ultra-Clean Rooms for Fabrication Use - J. C. Little
July 14	Position Monitoring Devices - L. G. Whitten
July 15	Position Monitoring Devices - L. G. Whitten
July 18, 1966	Visual Aids Presentation
July 19	Class Make-up
July 20	Visual Aids Presentation
July 21	Fabrication of Miniaturized Hardware for Space Equip. - George Oliphant
July 22	Non-Destructive Testing of Engineering Materials - R. E. Cofield
July 25, 1966	Modern Methods for Machine Tool Evaluation - R. E. Bohanan
July 26	Effects of Temperature on Precision of Machine Tool - H. F. Smith
July 27	1. Application of Hydrostatic Lubrication of Machine Tool Components - V. M. Hovis 2. Electronic Instrument Engineering - B. B. Bell

July 28	New Developments in Close Tolerance Machining - F. H. Broome
July 29	Applications of Numerical Control to Machining - K. W. Sommerfeld
August 1, 1966	Problem Areas in Fabrication - J. M. Googin
August 2	Maintenance Requirements for Numerical Control - K. B. Reedy
August 3	Numerically Controlled Gaging Machines - T. E. Douglass
August 4	Industrial Study
August 5	Programming for Numerically Controlled Machine Tools - A. H. Fowler
August 8, 1966	Programming - Ron Miskell
August 9	Programming - Ron Miskell
August 10	Problem Areas in Quality Control - G. R. Jasny
August 11	General Orientation EDPM Systems - Phyllis Johnson
August 12	K-25 Computer Demonstration Tour
August 15, 1966	Critical Path Scheduling - Ron Ragland
August 16	Critical Path Scheduling - Ron Ragland
August 17	Reproduction and Engineering Documentation - Don McMurray
August 18	Class Make-up
August 19	Bull Run Steam Plant Demonstration Tour
August 22, 1966	The Role of Metallurgy in the Fabrication of Very Large Parts - A. C. Neeley
August 23	Industrial Interferometry - L. G. Whitten
August 24	Length Measuring Laser Interferometer - H. S. Corey

August 25	Practical Developments in Precision Machining Techniques - J. B. Richards
August 26	Automatic Tool Positions - J. B. Richards

COURSE OUTLINE
1966 VOCATIONAL-TECHNICAL IN-SERVICE TEACHER TRAINING INSTITUTE
MECHNICAL TECHNOLOGY AND DRAFTING
IE 2010 AND IE 2020

Training Supervisor - J. E. Miller

First Week (June 27-July 1) University of Tennessee Orientation

Second Week (July 4 - 8)

Monday	Holiday	
Tuesday 1:00-1:50	Introduction-Survey of Course	J. L. Waters J. E. Miller
2:00-4:30	Drafting Laboratory(3)	P. F. Boyer
Wed. & Th 1:00-1:50(1)	Shop Practices(2) (Observation)	W. F. Cartwright
2:00-2:50(1)	True Position Dimensioning	C. P. Tudor
3:00-4:30	Drafting Laboratory(3)	P. F. Boyer
Friday 12:00-2:20	Value Engineering Lecture	W. E. O'Dell
2:30-3:20	Value Engineering Film	
3:30-4:30	Value Engineering Laboratory	

Third Week (July 11-15)

Monday 12:00-4:30	ORNL Demonstration	
T W T F 1:00-1:50	Shop Practices	W. F. Cartwright
2:00-2:50	Drafting Laboratory	P. F. Boyer
3:00-4:30	Drafting Laboratory (Examination)	P. F. Boyer

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(1) Two groups of ten persons each will alternate classes during the 1:00-1:50 and 2:50 sessions.

(2) Shop practices consist of demonstrations in the use and capability of a variation of machine tools including tracer and numerically controlled equipment.

(3) The drafting laboratory will provide opportunity for problem solving in the area of tool design for numerically controlled and tracer controlled machines. It will also involve practice in drawing formats and coding techniques.

Fourth Week (July 18-22)

Monday 1:00-4:30	History and Current Welding Processes. Lecture, slides, and movies concerning the history of welding processes, including arc welding (shielded, gas submerged), gas welding, resistance welding , forge welding, and brazing	J. C. Thompson, Jr.
Tuesday 12:00-12:50	Shop Practices	W. F. Cartwright
1:00-2:00	Applied Welding Technology. Lecture - Weld Joint Design. Discussions of different weld joint designs including terminology, symbols, applications, special problems, welding procedures and code requirements.	J. C. Thompson, Jr.
2:10-3:00	Basic Welding Metallurgy	F. J. Lambert
3:10-4:10	Advanced Welding Processes	P. W. Turner
Wednesday 1:00-4:30	Advanced Welding Processes	P. W. Turner C. L. Estes A. J. Moorhead D. G. Scott R. A. Huber
Thursday 1:00-4:30	Weld Test Shop Work. Field instruction observation and laboratory practice in gas arc welding, resistance welding, submerged arc welding, and semi-automatic welding. Will also include discussions of welder training and certification.	E. N. Rogers
Friday 1:00-4:30	Industrial Radiography. Lecture - The Physics of Radiography. The fundamentals for making a radiographic exposure including X-ray production, X-ray absorption and image recording	J. W. Garber
	Lecture - Radiation Safety. Discussion of hazards to human body, radiation dosage, radiation detection, shielding and interlock systems	C. M. West
	Lecture and Demonstration - The Fundamentals of Practical Radiography. Discussion of physical setup, film handling, radiation protection, exposure, identification and film processing.	J. W. Garber
	Film, "This is Radiography," Eastman Kodak, color, animated, 15 minutes. Gives fundamentals of exposure; energy, intensity, and inverse square law.	

Fourth Week (July 18-22) (Contd.)

	Lecture - Applications of Radiography. Discussion and slides of the application of radiography to the detection of defects, inclusions, alloy inhomogeneities, material identification, dimensional analysis, assembly inspection and corrosion detection.	J. W. Garber

Fifth Week (July 25-29)

Monday 1:00-3:00	Laboratory Participation in Radiography. Familiarization with X-ray generator, film holders, film handling, radiation protection, film processing and viewing of actual radiographs. To include the production of a radiograph on Polaroid film.	J. W. Garber
3:00-4:00	Lecture and Demonstration - Gamma-source Radiography. Discussions of radioactive source terminology, types of sources, intensities, source holders and mechanisms, radiation safety and field radiography.	L. M. Fitzgerald
4:00-4:30	Lecture - Advanced Radiographic Techniques and Equipment. Discussions of microradiography, color radiography, pulse or flash radiography, remote television imaging and fluoroscopy.	J. W. Garber
Tuesday 1:00-1:30	Miscellaneous Nondestructive Testing. Lecture and Demonstration - The Physics and Applications of Ultrasonics. Discussion of mechanical vibration, frequency, wave and particle motion, elastic constants, wave interactions at material discontinuities, resonance phenomena and ultrasonic wave production. Discussions of applications of ultrasonics to material defect, thickness gauging, bond condition and elastic constant determination	R. E. Cofield
1:30-1:50	Laboratory Participation in Ultrasonics. Demonstrations for equipment familiarization, defect detection, and thickness gauging.	R. E. Cofield
2:00-2:30	Lecture - Eddy Current Testing and Magnetic Induction Gauging. Discussion of eddy current test principles and typical applications to materials testing. Will include demonstrations. Discussions of induction principles and the applications of the Permascope to material testing. Will include a demonstration.	R. E. Cofield

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Fifth Week (July 25-29) (Contd.)

2:30-3:20	Lecture and Demonstration - Beta Back Scatter Gauging and Radiation Absorption Gauging.	R. A. Hobbs
3:30-4:10	Lecture - Microwave and Thermal Testing. Basic principles of microwaves and their application to materials testing. Basic principles and applications of thermal energy to nondestructive testing.	M. H. Shelton
Wednesday 1:00-1:50	Metallurgical and Mechanical Testing. Lecture - Scope of Mechanical Properties Testing. Discussion of principles and applications of tensile, compression, hardness and impact testing. Observations of sample specimens, data, and results of tests.	J. H. Smith
2:00-2:50	Lecture - Metallographic Applications. Discussion of principles and applications of metallography. Observation of samples of work.	R. H. Dean
3:00-4:10	Lecture - Strain Measuring Technology, Discussion and demonstration of principles and applications of strain gages, brittle coating and photoelastic plastic testing techniques.	P. J. Long
Thursday 1:00-1:40	Miscellaneous Testing. Lecture - Penetrant Testing. Discussion of principles and applications of liquid penetrant testing. Includes demonstration.	B. D. Lanter
1:50-2:20	Lecture - Magnetic Particle Testing. Discussion of principles and application of magnetic particle testing. Includes demonstration.	P. J. Long
2:30-3:10	Lecture and Demonstration - Pressure Testing. Principles and applications of pressure testing.	Bert Searles
3:20-4:00	Lecture - Mechanical Inspection. Mechanical inspection of lifting and hoisting equipment.	C. L. Bailey
Friday 1:00-3:20	General Physical Testing, General laboratory participation and discussions in small groups of areas of testing of particular interest to individuals.	J. W. Garber
3:20-4:30	Examination	

Sixth Week (August 1 - 5)

Monday 1:00-4:30	Estimating From Drawings Laboratory in Estimating Practice	W. C. Kuykendall
Tuesday 1:00-2:30	Shop Fabrication Use of Drawings	W. F. Cartwright
2:45-4:30	Y-12 Engineering Standards	J. H. Simms
Wednesday 1:00-4:30	Drafting Laboratory	P. F. Boyer
Thursday 1:00-4:30	Drafting Laboratory	P. F. Boyer
Friday 1:00-1:50	Lecture in Critical Path Scheduling	W. R. Ragland
2:00-4:30	Practice in Critical Path Scheduling	

Seventh Week (August 8-12)

Monday 1:00-4:30	Reproduction Techniques with Emphasis on Microfilm Process	Don McMurray
Tuesday 1:00-4:30	APT Part Programming I	R. V. Miskell

2.1 Basic APT Language

- 2.1.1 Variable Names vs. APT Vocabulary Words.
- 2.1.2 Scalers vs. Geometric Definitions.
- 2.1.3 Two-dimensional vs. Three-dimensional Surfaces.
- 2.1.4 Methods for Defining Lines.
- 2.1.5 Methods for Defining Circles.
- 2.1.6 Method of Defining Points.
- 2.1.7 Sample Programs

Seventh Week (August 8-12) (Contd.)

Tuesday (Contd.) 1:00-4:30	2.2 Computing Capability	
	2.2.1 Addition, Subtraction, etc.	
	2.2.2 Special Function	
	2.2.3 Use of Parentheses	
	2.2.4 Motion Commands	
	2.3.1 TØ, PAST, ØN, TANTØ, INDIRV, GØDLTA, TLØN, TLLFT, TLRGT	
	2.3.2 Drive Surface, Part Surface Terminology	
	2.3.3 Sample Programs	
	2.3.4 Tour of Central Data Processing Facility	
Wednesday 1:00-4:30	APT Part Programming II	R. V. Miskell
	3.1 Transformation	
	3.1.1 VECTØR	
	3.1.2 MATRIX	
	3.1.3 REFSYS, TRACUT	
	3.2 Diagnostics, APT Printouts	
	3.3 Looping	
	3.4 Macros	
	3.5 Copy Logic	
	3.6 Sample Programs	
Thursday 1:00-4:30	APT Programming III	R. V. Miskell
	4.1 Basic Postprocessor Commands	
	4.1.1 MACHIN, AUXFUN, CØØLNT, STØP	
	4.1.2 FEDRAT, CYCLE	
	4.2 Lathe Programming	
	4.2.1 SFM, TURRET, SPINDL	
	4.2.2 Sample Programs	

Seventh Week (August 8-12) (Contd.)

Friday	Computer Demonstration Tour, K-25	

Eighth Week (August 15-19)

M T W 1:00-1:50	True Positioning Dimensioning	C. P. Tudor
2:00-4:30	Drafting Laboratory	P. F. Boyer
Thursday 12:00-12:50	True Position Dimensioning	C. P. Tudor
1:00-4:30	Drafting Laboratory	P. F. Boyer
Friday 12:00-4:30	Bull Run Steam Plant Demonstration Tour	

Ninth Week (August 22-26)

M W T 1:00-1:50	True Position Dimensioning	C. P. Tudor
Tuesday 1:00-4:30	Drafting Laboratory	P. F. Boyer
2:00-4:30	Drafting Laboratory	P. F. Boyer
Friday 1:00-1:50	Summary	J. E. Miller J. L. Waters
2:00-4:00	Final Examination	

COURSE OUTLINE

1966 VOCATIONAL TECHNICAL IN-SERVICE TEACHER TRAINING INSTITUTE

INDUSTRIAL ELECTRONICS TECHNOLOGY AND MAINTENANCE

IE 2010 AND IE 2020

Training Supervisor - F. K. Booth

First Week (June 27 - July 1)   University of Tennessee Orientation

Second Week (July 4 - 8)

Monday	Holiday	
Tuesday 1:00-4:30	Class Organization Lecture - Various Systems of Remote Communication Used in Industry	W. J. Smith
Wednesday 1:00-4:30	Laboratory Session on Electro Writers and Facsimile Equipment . Test Quiz.	W. J. Smith
Thursday 1:00-4:30	Lecture - Radiation Instruments and Fire Alarm Systems	Tom Bagwell and Ed Pipes
Friday 1:00-4:30*	Laboratory Session on Radiation and Fire Alarm Systems. Test Quiz	Tom Bagwell and Ed Pipes

Third Week (July 11-15)

Monday	ORNL Tour	
Tuesday 1:00-4:30	Lecture - Industrial Instruments, Both Electrical and Pneumatic. Start laboratory session, using instruments.	B. R. Disney
Wednesday 1:00-4:30	Laboratory Session using typical industrial instruments. Test quiz on industrial instruments.	B. R. Disney
Thursday 1:00-4:30	Lecture - Production Measurements and Instrumentation of High Vacua	T. A. Hickman
Friday	Field trip to Building 9201-2 for lecture on Application of High Vacua and tour of DCX II facilities	T. A. Hickman

*The one-hour seminar period from 12:00 noon to 1:00 p.m. on these days will be used for lecture on subjects selected by class vote Tuesday, July 5, 1966.

Fourth Week (July 18-22)

Monday 1:00-4:30	Lecture on Transducers	Neal Smith
Tuesday 1:00-4:30*	Laboratory Session - demonstrating operation of typical transducers	Neal Smith
Wednesday 1:00-4:30	Continuation of Transducer Laboratory Session	Neal Smith
Thursday 1:00-4:30	General Test on all material covered to this date	Frank Booth
Friday 1:00-2:30	Lecture - Printed Circuit Fabrication	Chester Wright
2:30-4:30	Start fabrication of printed circuit boards and metal photo sample. Operational steps staggered to allow individual participation in each phase of work.	

Fifth Week (July 25-29)

Monday 1:00-4:30	Continuation of Printed Circuit Fabrication	Chester Wright
Tuesday 1:00-3:30	All groups complete printed circuit board and metal photo sample	Chester Wright
3:30-4:30	Lecture - Chemical Milling Technique	Chester Wright
Wednesday 1:00-2:45	Mount components on printed circuit board. Check operation.	Tom Bagwell
2:45-4:30	Test quiz on Printed Circuit Fabrication	Frank Booth
Thursday 1:00-2:30	Lecture - Position Control Fundamentals	Ed Pipes
2:30-4:30	Lecture - Tracer Control	Ed Pipes
Friday 1:00-4:30	Field trip to Building 9766 to observe automatic machines in operation, and programmed instruction (MIM-1) in binary number system. Groups staggered to allow better individual contact	Ed Pipes and Frank Booth

*The one-hour seminar period from 12:00 noon to 1:00 p.m. on these days will be used for lecture on subjects selected by class vote Tuesday, July 5, 1966.

Sixth Week (August 1 - 5)

Monday 1:00-4:30	Lecture - Computer Math, Gating, and Logic	Neal Smith
Tuesday 1:00-2:30	Lecture - Sensing Devices, Reviewing Transducers and Related Systems	Neal Smith
2:30-4:30	Test quiz on Introduction to Position Control	Neal Smith
Wednesday 1:00-4:30	Lecture - Input Systems and Demonstration, Using the General Electric Mark Centry Numerical Control Trainer	Neal Smith
Thursday 1:00-4:30	Lecture - Storage Systems and Computer Memory	Neal Smith
Friday 1:00-4:30	Lecture - Computer Methods of Handling Numbers, and How Information is Read Out	Neal Smith

Seventh Week (August 8 - 12)

Monday 1:00-4:30	Laboratory work, using General Electric Mark Century numerical control trainer and lecture on nondestructive testing of electronic packages. Groups staggered for better contact.	Neal Smith Joel Garber
Tuesday 1:00-4:30	Laboratory session connecting printed circuits fabricated in earlier sessions into large binary counter. Review of position control.	Neal Smith
Wednesday 1:00-3:00	Test on position control.	Neal Smith Frank Booth
3:00-4:30	Discussion of test to clear up any questions not understood.	Neal Smith Frank Booth
Thursday 1:00-4:30	Lecture - Physical and Electrical Standards	J. F. Ellis R. D. Alexander
Friday	Tour of K-25 computer.	

Eighth Week (August 15 - 19)

Monday 1:00-4:30	Tour of Standards Laboratories and Maintenance Facilities in Building 9737. Staggered groups for better contact.

Eighth Week (August 15 - 19) (Contd.)

Tuesday 1:00-2:10	Finish tours of Laboratory and Maintenance Facilities.	
2:10-4:30	Review and test quiz.	J. F. Ellis R. D. Alexander Frank Booth
Wednesday 1:00-4:30	Lecture - Microelectronics and Integrated Circuits	J. J. Henry
Thursday 1:00-4:30*	Lecture - Biology Program and Instrumentation Found in Y-12	John Reagan R. V. Anderson
Friday	Tour of Bull Run Steam Plant.	

Nineth Week (August 22 - 26)

Monday 1:00-4:30	Tour of Biology Area.	
Tuesday 1:00-4:30	Review and test on Biology instruments.	R. V. Anderson Frank Booth
Wednesday 1:00-4:30	Lecture - Demonstration of Laser	Paul Griffin
Thursday 1:00-4:30	Lecture - X-Ray Principles and General Review	Ed Pipes Frank Booth
Friday 1:00-3:00	Final Test	Frank Booth
3:00-4:30	Critique of series.	Frank Booth

*The one-hour seminar period from 12:00 noon to 1:00 p.m. on these days will be used for lecture on subjects selected by class vote Tuesday, July 5, 1966.

COURSE OUTLINE

1966 VOCATIONAL IN-SERVICE TEACHER TRAINING INSTITUTE

MACHINE SHOP AND FABRICATION

IE 2010 and IE 2020

Training Supervisor - R. E. Dew

Second Week (July 5 - 8)

Tuesday 1:00-4:30	Shop Safety Lecture, slides, and movies concerning Plant safety programs emphasizing problem areas	L. M. Lawhorn
Wednesday 1:00-4:30	Job Processing and Work Management in Shop Operations. Lecture, Objectives of Management in Shop Operations, organization of Y-12 General Shops, types of customers, mechanics of job processing, and significant data process reports.	W. C. Kuykendall
Thursday 1:00-4:30	Job Processing and Work Management in Shop Operations Lecture, introduction of second session, shop familiarization, practical exercise, demonstrate use of Kearney System on more complicated parts, and comparison of various estimating systems.	W. C. Kuydendall
Friday 1:00-4:30	Value Engineering Lecture, movies and visual aids	W. E. O'Dell

Third Week (July 11-15)

Monday 1:00-4:30	ORNL Demonstration Tour	
Tuesday 1:00-4:30	Advance in Machine Tool Maintenance	
	Introduction and Training	S. M. Murphy
	Machine Tool Requirements	R. C. Green
	Machine Tool Evaluation	R. E. Bohanan
Wednesday 1:00-4:30	Duplicator	J. R. Richards
	Auto-Collimator and Alignment Interferometer	R. R. Baldwin
	Maintenance Equipment	D. E. Huffman
	Scraping	W. R. Barwick
	Vibration	L. L. Brown
Thursday 1:00-4:30	Lab Session	
Friday 1:00-4:30	Hydraulics Hydraulic circuits, components, test facilities, etc.	John Cobb R. E. Bohanan

Fourth Week (July 18 - 22)

Monday 1:00-4:30	History and Current Welding Processes Lecture, slides, and movies concerning gas welding, resistance welding, thermit welding, forge welding and brazing.	J. C. Thompson
Tuesday 1:00-4:30	Applied Welding Technology Lecture. Weld joint design, welding specific materials, and code requirements.	J. C. Thompson
Wednesday 1:00-4:30	Advanced Welding Techniques Lecture. Electro-slag welding, friction welding, semi-automatic welding, electron beam welding, and diffusion bonding.	J. C. Thompson
Thursday 1:00-4:30	Mechanical Testing Lecture and demonstrations of tensil testing, compression testing, hardness testing, creep testing, impact testing and metallographic analysis.	P. J. Long
Friday 1:00-4:30	Weld Test Shop Work Field instruction observation and laboratory practice in gas arc welding, resistance welding, submerged arc welding and semi-automatic welding.	E. N. Rogers

Fifth Week (July 25 - 29)

Monday 1:00-4:30	Introduction to Metallurgy Lecture and Slides	W. T. Carey
Tuesday 1:00-4:30	Materials and Properties Lecture, aluminum, copper, stainless, heat treatment, etc.	Paul Evans
Wednesday 1:00-4:30	Casting, Pressing, and Sintering Lecture and Slides, Castings Processing and Sintering	A. B. Townsend W. A. Pfeiler
Thursday 1:00-4:30	Non-Destructive Testing Lecture and demonstration, radiography, ultrasonics, electromagnetic testing and radiation testing	J. W. Garber
Friday 1:00-4:00	Rolling, Forming and Forgings Lecture and Slides	W. T. Carey J. E. Thompson
4:00-4:30	Examination	R. E. Dew

Sixth Week (August 1 - 5)

Monday	History of Measurement	
1:00-4:30	Lecture, movies. Dimensional inspection organization	L. G. Whitten
Tuesday	Inspection Equipment	
1:00-4:30	Lecture and demonstration manual equipment	M. E. O'Hara
Wednesday	Inspection Equipment	
1:00-4:30	Lecture, movies and demonstration automatic equipment and metrology	M. E. O'Hara L. G. Whitten
Thursday	Quality Assurance	
1:00-4:30	Lecture, slides, and demonstration. Gage laboratory, sampling, plan and statistics	E. F. Gambill J. P. Reavis
Friday	Numerical Control Machining	
1:00-4:30	Lecture and demonstration on preparation of tape	R. V. Miskell

Seventh Week (August 8-12)

Monday	Machine Tool Applications	R. E. Huffman
1:00-2:00	Classroom lecture - Operating a tape-controlled machine.	
2:00-4:30	Laboratory - Demonstration and application.	
Group 1	Numerically controlled jig bore	
Group 2	Lathe with readout system	
Group 3	Duplicator lathe	
Group 4	Deep hole drilling	
Tuesday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Readout Systems	O. K. Sergeant
2:00-4:30	Laboratory - Demonstration and application	
Group 1	Numerically controlled jig bore	
Group 2	Lathe with readout system	
Group 3	Duplicator lathe	
Group 4	Deep hole drilling	
Wednesday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Readout Systems	O. K. Sergeant
2:00-4:30	Laboratory - Demonstration and application	
Group 1	Lathe with readout system	
Group 2	Numerical controlled jig bore	
Group 3	Deep hole drilling	
Group 4	Duplicator	

Seventh Week (August 8-12) (Contd.)

Thursday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Precision Tracing System	K. O. Pearson
2:00-4:30	Laboratory - demonstration and application	
Group 1	Lathe with readout system	
Group 2	Numerical controlled jib bore	
Group 3	Deep hole drilling	
Group 4	Duplicator lathe	
Friday	K-25 Demonstration Tour	

Eighth Week (August 15-19)

Monday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Precision Tracing Systems	K. O. Pearson
2:00-4:30	Laboratory - demonstration and application	
Group 1	Duplicator lathe	
Group 2	Deep hole drill	
Group 3	Lathe with readout system	
Group 4	Numerical controlled jig bore	
Tuesday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Cutting Tools	J. S. Hurst
2:00-4:30	Laboratory - demonstration and application	
Group 1	Duplicator lathe	
Group 2	Deep hole drill	
Group 3	Lathe with readout system	
Group 4	Numerical controlled jig bore	
Wednesday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Deep Hole Drilling	D. E. Huffman
2:00-4:30	Laboratory - demonstration and application	
Group 1	Deep hole drilling	
Group 2	Duplicator lathe	
Group 3	Numerical controlled jig bore	
Group 4	Lathe with readout system	
Thursday	Machine Tool Applications	
1:00-2:00	Classroom lecture - Sound and Light as Related to Machine Tools and Accurate Measuring Techniques	O. K. Sergeant
2:00-4:30	Laboratory - demonstration and application	
Group 1	Deep hole drilling	
Group 2	Duplicator lathe	
Group 3	Numerical controlled jig bore	
Group 4	Lathe with readout system	
Friday	Bull Run Tour	

Ninth Week (August 22-26)

Monday 1:00-4:30	Lecture - South and Light as Related to Machine Tools and Accurate Measuring Techniques	O. K. Sergeant
Tuesday 1:00-4:30	True Position Dimensioning Classroom - Lecture and demonstration	C. P. Tudor
Wednesday 1:00-4:30	Lecture and Demonstration on Air Bearings Evaluation of Machine Tools	P. J. Steger J. S. Oakwood
Thursday 1:00-4:30	Electro-Discharge Machining Classroom - lecture and movies	D. R. Alford
Friday 1:00-2:30	Electro Chemical Machining and Review	R. F. Holdway
2:30-4:30	Final Exam	

COURSE OUTLINE

1967 VOCATIONAL-TECHNICAL IN-SERVICE TEACHER INSTITUTE

UNIVERSITY OF TENNESSEE SESSIONS

Course Number, Undergraduate Courses

I. Ed. 4510	Seminar in Industrial Education (3 qtr. hours)
I. Ed. 4520	New Developments in Industrial Education (3 qtr. hours)

Course Number, Graduate Courses

I. Ed. 5510	Seminar in Industrial-Technical Education (3 qtr. hours)
I. Ed. 5540	New Developments in Industrial-Technical Education (3 qtr. hours)

The above courses are those offered at the Institute from 8:00 to 12:00 each weekday from June 21 - August 11 except for field trips (See Seminar Schedule) and the four day vacation period July 1 - 4. Undergraduate students will enroll in I. Ed. 4510 and I. Ed. 4520 for a total of six credit hours. Graduate students will enroll in I. Ed. 5510 and I. Ed. 5540 for a total of six quarter hours. Both undergraduate and graduate students will attend the same seminar, lecture and workshop sessions in the morning, but graduate students will be required to complete additional special work projects to be assigned on an individual basis.

All students will also enroll in six quarter hours of studies related to their technical specialties; please see the tentative course outlines for the course number and title of the technical area you have been appointed. Again, both graduate and undergraduate students will attend the same lecture and laboratory sessions for the technical area they have been appointed with the graduate students required to complete special additional work assignments. The course numbers for the technical sessions will be the same for both graduate and undergraduate students, but the former will register for graduate credit and a "G" will appear on the individual's transcript. Students who have either a Baccalaureate or Masters degree may elect to take any or all of the coursework offered at the Institute for graduate or undergraduate credit. All others must enroll in the courses

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for undergraduate credit only.

The morning seminar, lecture, demonstrations, and workshop sessions are structured to give the participants an overview of educational innovations, timely current events, significant developments, and emerging trends as they relate specifically to the four technical areas of instruction and to industrial-technical education in general. Workshop and course assignments will be oriented toward the development of visual aids and instructional materials which will incorporate the Union Carbide technical instruction in a form best suited to teach participants' home teaching situation. The students will be required to furnish note-taking and miscellaneous materials. All students are to incorporate their individual notes, handout materials and classroom and outside assignments into a notebook to be turned in for grading the last week of the Institute.

All students should bring with them to Oak Ridge at least two and preferably three copies of the following materials which they presently use for instruction of their technical specialties at their institution: course outlines, courses of study, information and instruction sheets, transparencies and other visual aid materials, and any other related instructional material. They should also bring a copy of their basic textbooks used by their students and the major reference books used by the instructor. Any additional materials, such as professional industrial education and visual aid construction texts, may also prove helpful. All students should bring a small drawing board and basic drafting instruments. A typewriter, if you have one, may prove to be quite useful in preparing instruction materials, notebooks, etc.

COURSE OUTLINE

1967 VOCATIONAL-TECHNICAL IN-SERVICE TEACHER INSTITUTE

UNIVERSITY OF TENNESSEE SESSIONS

First Week (June 19 - 23)

Monday 8:30-4:30	Orientation and Registration	Staff, 9720-6 Auditorium
Tuesday 8:00-4:30	Orientation	Staff, 9720-6 Auditorium
Wednesday, Thursday, and Friday 8:00-12:00	Vocational-Technical Education in the Ten Southeastern States	B. E. Childers, U. S. Office of Education Regional Representative, 9720-6, Auditorium

Second Week (June 26 - 30)

Monday 8:00-12:00	See large and small group session schedule	Staff, 9720-6 Auditorium
Tuesday, Wednesday, Thursday, and Friday 8:00-12:00	Demonstration and workshop sessions on 3M visual aid and microfilm equipment	3M Company Representative 9720-6 Auditorium

Third Week (July 3 - 7)

Monday	Holiday	
Tuesday	Holiday	
Wednesday 8:00-11:00	See large and small group session schedule	Staff
Thursday 8:00-12:00	See large and small group session schedule	Staff
Friday 8:00-4:30	Field trip to University of Tennessee Planning Laboratory (all groups), lunch at U.T. Student Center. Tour of K-25 computer center by Machining, Welding-Physical Testing groups in afternoon. The Electronics and Drafting Tech. groups return to Y-12 Plant for regular instruction. (They will tour K-25 in the afternoon of July 14.)	R. Pearson and Staff

Fourth Week (July 10 - 14)

Monday through Friday	Demonstrations and workshop sessions of laboratory and shop equipment. Separate presentations are arranged for each of the four technical areas.	Various Industrial Firms, Detailed schedule to be issued at later date.

Fifth Week (July 17 - 21)

Monday - Tuesday 8:00-12:00	See large and small group session schedule	Staff
Wednesday-Thursday 8:00-12:00	Seminar on current and future federal vocational education legislation, the American Vocational Association Program of Work, and evaluation and accreditation of Vocational-Technical programs.	Miss Ellis, Directo, Field Services Am. Voc. Assn., 9720-6, Auditorium
Friday 8:00-12:00	See large and small group session schedule	Staff

Sixth Week (July 24 - 28)

Monday - Wednesday 8:00-12:00; Thursday & Friday, 8:00-11:00.	Demonstrations and workshop activities on Keuffel and Esser visual aids materials, processes and equipment.	K&E Representative, 9720-6 Auditorium
Thursday & Friday 11:00-12:00	See large and small group session schedule	Staff

Seventh Week (July 31 - August 4)

Monday - Wednesday 8:00-12:00	Demonstrations and workshop activities of mobile learning laboratory equipment, a wide variety of project equipment, and video tape units.	Visual Education Company Representative, 9720-6, Auditorium.
Thursday & Friday, 11:00-12:00	See large and small group session schedule	Staff

Eighth Week (August 7 - 11)

Monday - Tuesday 8:00-12:00	Overview of Eric System and the Ohio Center for Vocational and Technical Education, selected topics on vocational-technical education.	Mr. White Ohio C.V.T.E. Representative 9720-6 Auditorium

Tuesday 12:00	U. T. Coursework Assignments Due	
Wednesday-Thursday 8:00-12:00	Purpose, goals, publications and research projects of the American Technical Education Association and trends in technical education	Professor Dobrovolny, Head, General Engineering Dept and ATEA Trustee, 9720-6 Auditorium
Thursday 1:30-2:30	U. T. Final Exam	Staff, 9720-6 Auditorium
5:00	Picnic	Carbide Park
Friday 8:00-12:00	Seminar on Vocational Industrial Clubs of America	Mr. Johnson, Executive Director of VICCA, 9720-6 Auditorium
12:00-1:30	Lunch	
1:30-2:00	Graduation Ceremony	

MECHANICAL DRAFTING TECHNOLOGY

Training Supervisor - B. G. Myers

Course Number

I.Ed. 4073-74 Tool and Machine Design
(6 quarter hours)

The technical sessions will meet from 12:30 to 4:30 each weekday from June 31 - August 11, except when seminar sessions are scheduled (see seminar schedule) and the four day vacation period July 1-4.

The afternoon technical sessions outlined on the following pages will be composed of approximately 40 percent lecture and 60 percent laboratory activities. All textbooks and supplementary publications for the technical courses will be furnished by the Institute on a loan basis. All students are expected to furnish note-taking materials and incorporate their individual notes with all handout materials into a notebook to be turned in to the technical area training supervisor at the end of the Institute. After they are graded they will be returned to the student.

Periodic check tests and a final examination will be administered during the Institute. All students will also be expected to complete various outside assignments dealing with the development of instructional materials utilizing the technical content of the afternoon sessions for their home teaching assignments.

Please bring your safety glasses.

First Week (June 19 - 23)

Monday	Orientation	ORAU
Tuesday	Orientation and Testing	ORAU and UT
Wednesday		
12:30-4:30	Orientation and Overview The Draftsman's Role in Industry Course objectives and outlines	Staff
Thursday		
12:30-4:30	The Draftsman's Function in Tooling and Programming for Numerically Controlled Machines Lecture, Shop Observation, Film and Discussion	Staff
Friday		
12:30-1:30	Mechanical Design Lecture	J. E. Miller
1:30-4:30	Laboratory	
	Technical writing assignments	B. G. Myers

Second Week (June 26 - 30)

Monday		
12:30-4:30	Machine Tool Applications (Tape Control)	Staff
Tuesday		
12:30-4:30	Machine Tool Applications (Tape Control)	Staff
Wednesday		
12:30-4:30	Machine Tool Applications (Tape Control)	Staff
Thursday		
12:30-3:30	Mechanical Design Lecture Laboratory	J. E. Miller
*3:30-4:30	True Position Dimensioning	C. P. Tudor
Friday		
12:30-2:00	Industrial Welding, Applications in Design	J. C. Thompson
2:00-3:30	Lab - Welding - TIG, MIG, burning gas metal arc, gas tungsten arc	
3:30-4:30	True Position Dimensioning	C. P. Tudor

Third Week (July 3 - 7)

Monday	Holiday
Tuesday	Holiday

*Industrial concepts of True Position Dimensioning utilizing a programmed text requiring approximately 15 hours to complete.

Third Week (July 3 - 7)

Wednesday

12:30-2:00	Introduction to Physical Testing	Joel Garber
2:00-3:30	Non-Destructive Testing	R. E. Cofiel
3:30-4:30	Lab-Physical Testing	

Thursday

12:30-2:00	Automatic Data Collection	A.M. Christm
2:00-3:30	General Orientation EDPM Systems	Phyllis John
3:30-4:30	True Position Dimensioning	C. P. Tudor

Friday

12:30-3:30	Drafting specifications for Physical Testing and Lab	J. E. Miller
3:30-4:30	True Position Dimensioning	C. P. Tudor

Fourth Week (July 10 - 14)

Monday

12:30-1:30	Lab	J. E. Miller
1:30-3:30	Value Analysis in Industry	W. E. O'Dell
3:30-4:30	True Position Dimensioning	C. P. Tudor

Tuesday

12:30-1:30	Lab	J. E. Miller
1:30-3:30	Applications of Value Analysis - The Team Approach	W. E. O'Dell
3:30-4:30	True Position Dimensioning	C. P. Tudor

Wednesday

12:30-1:30	Lab	J. E. Miller
1:30-4:30	Value Analysis Design Project	W. E. O'Dell

Thursday

12:30-2:00	Programming for Numerical Control	A. H. Fowler
2:00-4:30	Value Analysis Design Project	W. E. O'Dell

Friday

12:30-2:00	Numerical Control Machining	K. Kahl
2:00-4:30	Tour K-25 Computer Center	

Fifth Week (July 17 - 21)

Monday

12:30-3:30	Lab	J. E. Miller
3:30-4:30	True Position Dimensioning	C. P. Tudor

Tuesday

12:30-2:00	Electronic Instrument Engineering	B. B. Bell
2:00-3:30	Reading Modern Electronics Drawings	Staff
3:30-4:30	Visit to 9737 Electronics Standards Lab, Testing and Fabrication Shops	

Fifth Week (July 17 - 21)

Wednesday		
12:30-3:30	Lab	J. E. Miller
3:30-4:30	True Position Dimensioning	C. P. Tudor
Thursday		
12:30-1:30	Application of Numerical Control Drafting Machines	R. V. Miskell
1:30-3:30	Lab	J.E. Miller
3:30-4:30	True Position Dimensioning	C. P. Tudor
Friday	Tour ORNL - Industrial machine shops, reactor, industrial labs, etc.	

Sixth Week (July 24 - 28)

Monday		
12:30-2:00	General Industrial Inspection Methods	L. G. Whitten
2:00-3:30	Precision Shop Tolerances and Gaging	R. T. Wyrick
3:30-4:30	True Position Dimensioning	C. P. Tudor
Tuesday	Drafting Materials Workshop	K & E
Wednesday	Drafting Materials Workshop	K & E
Thursday	Facility Design Drawings and Specifications for lump sum construction	C. Hobson
	Draftsman's field problems - (biology construction)	Warren Niles Inspection Engineer
Friday		
12:30-1:30	Numerical Control	R. V. Miskell
1:30-3:30	Lab	J. E. Miller
3:30-4:30	True Position Dimensioning	C. P. Tudor

Seventh Week (July 31 - August 4)

Monday		
12:30-2:00	Critical Path Scheduling	W. R. Ragland
2:00-3:00	Numerical Control	R. V. Miskell
3:00-4:30	Lab	J. E. Miller
Tuesday		
12:30-2:00	Critical Path Scheduling	W. R. Ragland
2:00-4:30	Plastic Tooling in Industry (press tooling, jigs, fixtures, molds, etc.)	Devcon Corp.
Wednesday		
12:30-1:30	Numerical Control	R. V. Miskell
1:30-4:30	Lab	J. E. Miller
Thursday		
12:30-4:30	Lab - Preparation of Critical Path Design Schedule	J. E. Miller

Seventh Week (July 31 - August 4)

Friday		
12:30-2:00	Industrial Reproduction, microfilming and records systems	D. McMurray
2:00-4:30	Lab	J. E. Miller

Eighth Week (August 7 - 11)

Monday		
12:30-4:30	Lab	J. E. Miller
Tuesday	Review of Quarter	Staff
Wednesday	Final Exams	
Thursday		
12:30	Future U. S. Industrial Development	J. M. Googin
	Picnic	
Friday	Graduation	

ELECTRONICS TECHNOLOGY

Training Supervisor - F. Booth

Course Number

I.Ed. 4063-64	Industrial Electronics (6 quarter hours)

The technical sessions will meet from 12:30 to 4:30 each weekday from June 31 - August 11 except when seminar sessions are scheduled (See Seminar Schedule) and the four day vacation period July 1 - 4.

The afternoon technical sessions outlined on the following pages will be composed of approximately 60 percent lecture and 40 percent laboratory activities. All text books and supplementary publications for the technical courses will be furnished by the Institute on a loan basis. All students are expected to furnish note-taking materials and incorporate their individual notes with all handout materials into a notebook to be turned in to the technical area training supervisor at the end of the Institute. After they are graded, they will be returned to the student.

Periodic check tests and a final examination will be administered during the Institute. All students will also be expected to complete various outside assignments dealing with the development of instructional materials utilizing the technical content of the afternoon sessions for their home teaching assignments.

Bring safety glasses if you have them.

First Week (June 19 - 23)

Monday		
8:30-4:30	Orientation and Registration	ORAU
Tuesday		
8:00-4:30	Orientation and Testing	ORAU and UT
Wednesday		
12:30-1:30	Organization into five groups of five each	Staff
1:30-4:30	Industrial Alarm Systems	
Thursday		
12:30-3:30	Continuation of Alarm Systems	Staff
3:30-4:30	Test Quiz	
Friday		
1:30-4:30	Industrial instrumentation	Staff

Second Week (June 26 - 30)

Monday		
12:30-4:30	Transistors; construction and application	Staff
Tuesday		
12:30-2:30	High Vacua	Staff
2:30-4:30	Bell jar evaporation of metal foil	
Wednesday		
12:30-2:30	Leak Detection	Staff
2:30-4:30	Leak Detectors	
Thursday		
12:30-1:30	Lecture on Sherwood	Staff
1:30-4:30	Tour 9201-2	
Friday		
12:30-1:30	Seminar, Industrial Welding Orientation	J. C. Thompson
1:30-4:30	Discussion period	

Third Week (July 3 - 7)

Monday	Holiday	
Tuesday	Holiday	
Wednesday		
12:30-1:30	Seminar, Introduction to Physical Testing	Joel Garber
1:30-2:30	Seminar, Non-destructive Testing of Engineering Materials	R. E. Cofield
2:30-4:30	Printed Circuit Boards and Metal Photo.	

Third Week (July 3 - 7) (Continued)

Thursday		
12:30-1:30	Seminar, Automated Data Collection	A. M. Christman
1:30-2:30	Seminar, General Orientation EDPM Systems	Phyllis Johnson
2:30-4:30	Printed Circuit Boards and Metal Photo.	
Friday		
12:30-2:30	Printed Circuit Boards and Metal Photo	Staff
2:30-4:30	Discussion Period	

Fourth Week (July 10 - 14)

Monday		
12:30-4:30	Printed Circuit Boards and Metal Photo	Staff
Tuesday		
12:30-4:30	Printed Circuit Boards and Metal Photo	Staff
Wednesday		
12:30-1:30	Lecture on Physical and Electrical Standards Philosophy	Staff
1:30-4:30	Classroom Show-Arounds	
Thursday		
12:30-1:30	Seminar, Programming for Numerical Control	A. H. Fowler
1:30-2:30	Lecture on Physical and Electrical Standards Lab Methods	Staff
2:30-4:30	Standards Calibration Work	
Friday		
12:30-1:30	Seminar, Numerical Control Machining	K. Kahl
1:30-4:30	Tour K-25 Computer Center	

Fifth Week (July 17 - 21)

Monday		
12:30-4:30	Standards Lab Work	Staff
Tuesday		
12:30-1:30	Seminar, Electronic Instrument Engineering	B. B. Bell
1:30-4:30	Machine Control -General Philosophy	Staff
Wednesday		
12:30-4:30	Tracer Control - Lecture, hand arounds	Staff
Thursday		
12:30-2:30	Tracers	Staff
2:30-4:30	Field Trip to 9709	
Friday		
12:30-1:30	Seminar, Modern Machine Tool Research	E. W. Bailey
1:30-4:30	Tour Oak Ridge National Laboratory	

Sixth Week (July 24 - 28)

Monday		
12:30-1:30	Seminar, General Industrial Inspection Methods	L. G. Whitten
1:30-4:30	Computer Math - Numbers Systems	
Tuesday		
12:30-4:30	Computer Sensing Devices	Staff
Wednesday		
12:30-4:30	Computer Input Systems	Staff
Thursday		
12:30-4:30	Computers - Memory and Storage	Staff
Friday		
12:30-4:30	Discussion	

Seventh Week (July 31 - August 4)

Monday		
12:30-1:30	Seminar, Critical Path Scheduling I	W. R. Ragland
1:30-4:30	Computers: Adders and other systems	Staff
Tuesday		
12:30-1:30	Seminar, Critical Path Scheduling II	W. R. Ragland
1:30-4:30	Computers - Summary and Test	Staff
Wednesday		
12:30-4:30	Non-destructive Testing	Staff
Thursday		
12:30-4:30	Coil Fabrication and Tour of 9737	Staff
Friday		
12:30-1:30	Seminar, Industrial Reproduction and Filing Systems	D. McMurray
1:30-4:30	Discussion period	

Eighth Week (August 7 - 11)

Monday		
12:30-4:30	Micro Electronics and Integrated Circuits	Staff
Tuesday		
12:30-4:30	Lasers; Lecture and Demonstration	Staff
Wednesday		
12:30-4:30	Testing, Critique	Staff
Thursday		
12:30-1:30	Seminar, Future U. S. Industrial Development	J. M. Googin
1:30-4:30	Discussion	
Friday	Graduation - University of Tennessee	

MACHINE SHOP AND FABRICATION

Training Supervisor - R. E. Dew

Course Number

I.Ed. 4083-84 Precision Forming and Shaping of Metals (6 quarter hours)

The technical sessions will meet from 12:30 to 4:30 each weekday from June 31 - August 11 except when seminar sessions are scheduled (See Seminar Schedule) and the four day vacation period July 1 - 4.

The afternoon technical sessions outlined on the following pages will be composed of approximately 50 percent lecture and 50 percent laboratory activities. All text books and supplementary publications for the technical courses will be furnished by the Institute on a loan basis. All students are expected to furnish note-taking materials and incorporate their individual notes with all handout materials into a notebook to be turned in to the technical area training supervisor at the end of the Institute. After they are graded, they will be returned to the student.

Periodic check tests and a final examination will be administered during the Institute. All students will also be expected to complete various outside assignments dealing with the development of instructional materials utilizing the technical content of the afternoon sessions for their home teaching assignments.

Eye protection is compulsory. Bring safety glasses and safety shoes if you have them. Also shop aprons or lab coats might be desirable.

MACHINE SHOP AND FABRICATION

Training Supervisor - R. E. Dew

First Week (June 19 - 23)

Monday	Orientation	ORAU
Tuesday	Orientation and Testing	UT
Wednesday	Shop Safety	
12:30-4:30	Lecture, slides, film and lab session	L. M. Lawhorn
Thursday	Machine Tool Applications	
12:30-2:30	Lecture - cutting tools	John Hurst
2:30-4:30	Laboratory - demonstration and application	
Friday	Blueprint Theory	
12:30-2:30	Lecture - True Position Dimensioning	C. P. Tudor
2:30-4:30	Laboratory work	

Second Week (June 26 - 30)

Monday	Blueprint Theory	
12:30-2:30	Lecture - True Position Dimensioning	C. P. Tudor
2:30-4:30	Laboratory work	
Tuesday	Machine Tool Applications	
12:30-4:30	Lecture - Tape controlled milling	Factory Representative
Wednesday	Machine Tool Applications	
12:30-4:30	Lecture - Tap controlled milling	Factory Representative
Thursday	Machine Tool Applications	
12:30-4:30	Lecture and demonstration - Tape controlled milling	Factory Representative
Friday	Seminar	
12:30-2:00	Lecture - Industrial Welding	J. C. Thompson
2:00-4:30	Lecture and demonstration tape mill	Factory Representative

Third Week (July 3 - 7)

Monday	Holiday	
Tuesday	Holiday	
Wednesday	Seminar	
12:30-1:20	Lecture and slides - Introduction to Physical Testing	Joel Garber
1:30-4:30	Laboratory work	
Thursday	Non-destructive Testing	
12:30-1:20	Lecture and slides - Testing of materials	R. E. Cofield
1:30-2:20	Lecture - Electronic Data Process	Phyllis Johnso
2:30-4:30	Laboratory work	

Third Week (July 3 - 7) (Continued)

Friday	Field Trips	
	U. T. Campus	
	Lunch	
	K-25 Demonstration Tour	

Fourth Week (July 10 - 14)

Monday	Machine Tool Applications	
12:30-2:30	Lecture - Precision Tracing Systems	K. O. Pearson
2:30-4:30	Laboratory work	
Tuesday	Machine Tool Applications	
12:30-2:30	Lecture - Precision Tracing Systems	K. O. Pearson
2:30-4:30	Laboratory work	
Wednesday	Machine Tool Applications	
12:30-2:30	Lecture - Digital Readout System	Staff
2:30-4:30	Laboratory work	
Thursday	Seminar	
12:30-1:20	Lecture - Introduction to Numerical Control	Andy Fowler
1:30-4:30	Laboratory work	
Friday	Seminar	
12:30-1:20	Lecture - Introduction to Numerical Control	Andy Fowler
1:30-4:30	Laboratory work	

Fifth Week (July 17 - 21)

Monday	Exam	
12:30-2:00	Mid-term exam	
2:00-4:30	Laboratory work	
Tuesday	Seminar	
12:30-1:20	Lecture - Electronic Instrument Engineering	B. B. Bell
1:30-4:30	Laboratory work	
Wednesday	Machine Tool Applications	
12:30-2:30	Lecture - Electro discharge machining	Dave Alford
2:30-4:30	Laboratory work	
Thursday		
12:30-4:30	Teachers Day	
Friday	Seminar and Field Trip	
12:30-1:20	Lecture - Modern machine tool research	Ed Bailey
1:30-4:30	Trip to Oak Ridge National Laboratory	

Sixth Week (July 24 - 28)

Monday	Seminar	
12:30-1:20	Lecture - Industrial Inspection Methods	L. G. Whitten
2:30-4:30	Laboratory work	

Sixth Week (July 24 - 38) (Continued)

Tuesday	Dimensional Inspection	
12:30-2:30	Lecture and demonstration - manual equipment	Staff
2:30-4:30	Laboratory work	
Wednesday	Dimensional Inspection	
12:30-2:30	Lecture and film - Automatic equipment	Staff
2:30-4:30	Laboratory work	
Thursday	Quality Assurance	
12:30-4:30	Lecture and slides - Gage laboratory	E. F. Gambill J. P. Reavis
Friday	Introduction to Metallurgy	
12:30-2:30	Lecture and slides	W. T. Carey
2:30-4:30	Laboratory work	

Seventh Week (July 31 - August 4)

Monday	Materials and Properties	
12:30-2:30	Lecture and slides	W. T. Carey
2:30-4:30	Lab work and visit to foundry	
Tuesday	Casting, Pressings, and Sintering	
12:30-2:30	Lecture and slides	W. T. Carey
2:30-4:30	Lab work and visit to foundry	
Wednesday	Rolling, Forming and Forgings	
12:30-2:30	Lecture and slides	W. T. Carey
2:30-4:30	Laboratory work	
Thursday	Advances in Machine Tool Maintenance	
12:30-2:30	Introduction and training	S. M. Murphy
	Machine Tool evaluation	R. E. Bohanan
	Machine Tool requirements	R. C. Greer
2:30-4:30	Laboratory work	
Friday	Advances in Machine Tool Maintenance	
12:30-2:30	Lecture - Duplicator	J. R. Richards
	Auto Colimator and Alignment	
	Interferometer	R. R. Baldwin
	Maintenance Equipment	D. E. Huffman
2:30- 4:30	Demonstration in Lab	

Eighth Week (August 7 - 11)

Monday	Advances in Machine Tool Maintenance	
12:30-2:30	Lecture - Vibrations	L. L. Brown
	Lecture - Scraping	W. R. Barwick
2:30-4:30	Demonstration in Lab	
Tuesday	Advances in Machine Tool Maintenance	
12:30-2:30	Lecture - Hydraulic circuits	John Cobb
2:30-4:30	Laboratory work	R.E. Bohanan

Eighth Week (August 7 - 11) (Continued)

Wednesday	Final Exam	
12:30-1:30	Exam	
1:30-4:30	Laboratory work	
Thursday	Picnic	Y-12 Recreation Park
Friday	Graduation	

WELDING AND PHYSICAL TESTING

Training Supervisor - B. D. Lanter

Course Number

I.Ed. 4043	Technical Physical Testing (3 quarter hours)
I.Ed. 4053	Advanced Welding, Brazing, and Adhesive Bonding Procedure (3 quarter hours)

The technical sessions will meet from 12:30 to 4:30 each weekday from June 31 - August 11 except when seminar sessions are scheduled (See Seminar Schedule) and the four day vacation period July 1 - 4.

The afternoon technical sessions outlined on the following pages will be composed of approximately 50 percent lecture and 50 percent laboratory activities. All textbooks and supplementary publications for the technical courses will be furnished by the Institute on a loan basis. All students are expected to furnish note-taking materials and incorporate their individual notes with all handout materials into a notebook to be turned in to the technical area training supervisor at the end of the Institute. After they are graded, they will be returned to the student.

Periodic check tests and a final examination will be administered during the Institute. All students will also be expected to complete various outside assignments dealing with the development of instructional materials utilizing the technical content of the afternoon sessions for their home teaching assignments.

Safety glasses are mandatory and you should bring them with you, especially if you require prescription lens. Please bring welding hoods and safety shoes if you have them. It is also suggested that you bring old clothing or coveralls for use in the welding laboratory sessions.

First Week (June 19 - 23)

Monday	Orientation	ORAU
Tuesday	Orientation and Testing	ORAU and UT
Wednesday		
12:30-1:30	Physical Testing and Welding Orientation	Staff
1:30-2:30	Safety Orientation	Bentley
2:30-4:30	Lab session	
Thursday		
12:30-2:30	Weld Test Shop Activities	E. Rogers
2:30-4:30	Lab	
Friday		
12:30-2:30	Weld Joint Design	E. Rogers
2:30-4:30	Lab	

Second Week (June 26 - 30)

Monday		
12:30-2:30	Industrial Radiography	J. Johnson
2:30-4:30	Lab	
Tuesday		
12:30-2:30	Applications of Radiography	J. Johnson
2:30-4:30	Lab	
Wednesday		
12:30-2:30	Penetrant Testing	Staff
2:30-4:30	Lab	
Thursday		
12:30-2:30	Magnetic Particle Testing	Staff
2:30-4:30	Lab	
Friday		
12:30-2:30	Industrial Welding Orientation	J. C. Thompson
2:30-4:30	Lab session	

Third Week (July 3 - 7)

Monday	Holiday	
Tuesday	Holiday	
Wednesday		
12:30-2:30	Introduction to Physical Testing	J. Garber
2:30-4:30	Non-Destructive Testing of Engineering Materials	R. E. Cofield
Thursday		
12:30-2:30	Automated Data Collection	A. M. Christman
2:30-4:30	General Orientation EDPM Systems	Phyllis Johnson
Friday	Tour - U.T. Campus Lunch K-25	

Fourth Week (July 10 - 14)

Monday		
12:30-2:30	Introduction to Ultrasonic Testing	Staff
2:30-4:30	Lab	
Tuesday		
12:30-2:30	Welding Applications of Ultrasonics	Staff
2:30-4:30	Lab	
Wednesday	Examination	
Thursday		
12:30-2:30	Programming for Numerical Control	A. H. Fowler
2:30-4:30	Lab	
Friday		
12:30-2:30	Numerical Control Machining	K. Kahl
2:30-4:30	Lab	

Fifth Week (July 17 - 21)

Monday		
12:30-2:30	Metallurgical and Mechanical Testing	Staff
2:30-4:30	Lab	
Tuesday		
12:30-2:30	Electronic Instrument Engineering	B. B. Bell
2:30-4:30	Lab	
Wednesday		
12:30-2:30	Metallurgical and Mechanical Testing	Staff
2:30-4:30	Lab	
Thursday		
12:30-2:30	Metallographic Applications	Staff
2:30-4:30	Lab	
Friday		
12:30-2:30	Modern Machine Tool Research	E. W. Bailey
2:30-4:30	Tour Oak Ridge National Laboratory	

Sixth Week (July 24 - 28)

Monday		
12:30-2:30	General Industrial Inspection Methods	L. G. Whitten
2:30-4:30	Lab	
Tuesday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	

Sixth Week (July 24 - 28) (Continued)

Wednesday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	
Thursday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	
Friday		
12:30-2:30	Introduction to Metallurgy	W. T. Carey
2:30-4:30	Lab	

Seventh Week (July 31 - August 4)

Monday		
12:30-2:30	Materials and Properties	W. T. Carey
2:30-4:30	Lab	
Tuesday		
12:30-2:30	Castings, Pressings, and Sintering	W. T. Carey
2:30-4:30	Lab	
Wednesday		
12:30-2:30	Rolling, forming and forgings	W. T. Carey
2:30-4:30	Lab	
Thursday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	
Friday		
12:30-2:30	Industrial Reproduction and Filing Systems	D. McMurray
2:30-4:30	Lab	

Eighth Week (August 7 - 11)

Monday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	
Tuesday		
12:30-2:30	*Modern Metal Joining Processes	C. L. Estes
2:30-4:30	Lab	
Wednesday	Final Exams	
Thursday		
12:30-2:30	Future U. S. Industrial Development	J. M. Googin
2:30-4:30	Lab	
Friday	Graduation - University of Tennessee	

*The course outline for this series of lectures will cover the following subjects: soldering, brazing, resistance welding, induction welding, thermit welding, electron beam welding, laser welding, solid state bonding, ultrasonic welding, welding of plastics and adhesive bonding.

Note: Lab sessions will be divided each day between welding activities and Physical Testing.

SEMINAR & TOUR SCHEDULE

BUILDING 9720-6 - Conference Room

12:30 P.M.

Date	Subject	Speaker
June 30	Industrial Welding Orientation	J. C. Thompson
June 30	Value Analysis	W. E. O'Dell
July 5	Introduction to Physical Testing	Joel Garber
July 5	Non-Destructive Testing of Engineering Materials	R. E. Cofield
July 6	Automated Data Collection	A. M. Christman
July 6	General Orientation EDPM Systems	Phyllis Johnson
July 13	Programming for Numerical Control	A. H. Fowler
July 14	Numerical Control Machining	K. Kahl
July 18	Electronic Instrument Engineering	B. B. Bell
July 21	Modern Machine Tool Research	E. W. Bailey
July 24	General Industrial Inspection Methods	L. G. Whitten
July 31	Critical Path Scheduling	W. R. Ragland
August 1	Critical Path Scheduling	W. R. Ragland
August 4	Industrial Reproduction and Filing Systems	D. McMurray
August 10	Future U. S. Industrial Development	J. M. Googin

TOURS

July 7 - University of Tennessee - K-25 Computer Center (Machining-Welding)
July 14 - K-25 Computer Center (Drafting-Electronics)
July 21 - Oak Ridge National Laboratory

APPENDIX B

Statistical Profiles, Names, Addresses
1966 and 1967 In-Service Institute Participants

PROFILE OF PARTICIPANTS
1966 IN-SERVICE INSTITUTE

Number: 60

Negroes: 16

Women: 2

Education (Highest Level Attained):

- Mean Attainment--14 years, 5 months
- Master's Degree--6
- Bachelor's Degree--21
- High School Diploma--33

Age:

- Mean--39.2 Years
- Range--24-59 Years

Teaching Experience:

- Mean--6.7 Years
- Range--0-25 Years

Level of Teaching:

- High School (including Industrial Arts)--28
- Four-Year College--11
- Post-High School Vocational, Technical or Junior College--21

Enrollment by States:

Tennessee	17	Kentucky	4
Virginia	12	West Virginia	4
Mississippi	7	Alabama	2
South Carolina	6	Georgia	2
Florida	5	North Carolina	1

1966 In-Service Institute Participants

Elvin H. Adams, Jr.
38 Franklin Road
Newport News, Virginia

Elmo O. Adkins
6310 Tracy Court
Alexandria, Virginia

Marshall E. Alexander
314 Bowwood Drive
Nashville, Tennessee

Trevor L. Anglin
208 Fifth Street
Iuka, Mississippi

R. L. Bailey
516 Hampton Avenue
Tallahassee, Florida

E. Irene Beals
3709 Eakers Street
Knoxville, Tennessee

James Woodrow Blanton
Route 4, Box 84
Gaffney, South Carolina

Robert A. Brewer
509 North 19th Avenue
Hattiesburg, Mississippi

Lee Roy Byrd
P. O. Box 214
Normal, Alabama

Charles R. Cavin
c/o Machine Shop
Humboldt High School
Humboldt, Tennessee

Estella E. Chandler (Mrs.)
303 Douglas Street
Institute, West Virginia

Edward L. Clark
Box 153
A & M University
Tallahassee, Florida

W. R. Cochran
Route 3
Seneca, South Carolina

Weyman Cunningham
3811 Sliger Circle
Chattanooga, Tennessee

Allard C. Davis
118 Liberty Street
Florence, South Carolina

Darwin Davis
Route 1
Oliver Springs, Tennessee

Joseph A. DiGiovanni
400 Wayne Avenue
Weirton, West Virginia

Alfred E. Edens
Box 41
Jonesville, Virginia

William R. Eister
7630 Whittington Drive
Richmond, Virginia

James W. Forte
Route A, Box 8
Poplarville, Mississippi

Wayne F. Gray
2839 Richards Avenue
Roanoke, Virginia

James W. Grigsby
P. O. Box 517
Jasper, Tennessee

Adger B. Hayes
R.F.D. 1
Pickens, South Carolina

Claude Henry
1823 Lapaloma Street
Memphis, Tennessee

James Holloway, Jr.
4424 Island Home Pike
Knoxville, Tennessee

Curtis Hixon
1322 Atkins Avenue
Paducah, Kentucky

F. Raymond Irvine, Jr.
719 Stafford Street
Tallahassee, Florida

Jackie Jackson
Route 1
Back Valley Road
Oliver Springs, Tennessee

Tommy Jenkins
Route 5
Sevierville, Tennessee

Bob Laster
P. O. Box 175
Hinds Junior College
Raymond, Mississippi

G. H. Loveridge
1599 Boulevard Lorraine, S
Atlanta, Georgia

Howard Moore
3508 Slem Street
Ashland, Kentucky

Arthur Morgan
1192 Devonport Circle
Lexington, Kentucky

Paul D. Mosley
1512 West Union Street
Jacksonville, Florida

H. A. Nelms
307 Baker Street
Indianola, Mississippi

H. D. Owen
Box 206
Cleveland, Virginia

Charles T. Patrick
Route 6, Box 219 B
Charleston, West Virginia

Archie Perry
3005 Turf Avenue
Huntsville, Alabama

Clifford E. Phillips
301 Columbia Road
Bristol, Tennessee

William N. Price
Route 6, Box 138
Pulaski, Tennessee

Ernest Priest
Wise County Vocational Schools
P. O. Box 576
Wise, Virginia

Harry E. Quattlebaum
6424 Dorchester Drive
Columbia, South Carolina

Robert M. Rice
121 Stafford Avenue
Paintsville, Kentucky

Kenneth E. Ross
3609 Wimberly Lane
Chattanooga, Tennessee

Arthur G. Rupard, Jr.
P. O. Box 636
Radford, Virginia

Louis J. Scherf
Route 7
Greeneville, Tennessee

J. Miles Seaborn
Chattanooga State Technical
Institute
400 West Chestnut Street
Chattanooga, Tennessee

Merchant E. Singleton
1200 Beverly Street
Fort Valley, Georgia

Paul M. Starnes
University of Florida
Gainesville, Florida

Hugh F. Statham
Copiah Lincoln Junior College
Wesson, Mississippi

Warren L. Talley
1100 Greenwood Road
Chattanooga, Tennessee

F. D. Taylor
1053 Poplar Street
Apartment E
Chesapeake, Virginia

Thomas P. Terry
Holmes Junior College
Goodman, Mississippi

T. E. Turpin
Virginia State College
Petersburg, Virginia

Arnold A. Westbrook
Box 341
Virginia State College
Petersburg, Virginia

Andrew Williams
2205 New Castle Road
Greensboro, North
Carolina

Albert R. Witt
18 Brockhaven Road
Chattanooga, Tennessee

Robert J. Woodbury
2400 Old Stone Drive
Anderson, South Carolina

Louie L. Wright
127 Hastings Drive
Belle, West Virginia

Allen Kinzer
1019 Preston Street
Radford, Virginia

PROFILE OF PARTICIPANTS
1967 IN-SERVICE INSTITUTE

Number: 100

Negroes: 11

Women: 1

Education (Highest Level Attained):

- Mean Attainment--13 years, 7 months
- Master's Degree--7
- Bachelor's Degree--23
- High School Diploma--70

Age:

- Mean--43.8 Years
- Range--24-62 Years

Experience:

- Trade (mean)--12.9 Years
- Teaching (mean)--5.9 Years

Level of Teaching:

- High School (Trade and Industrial)--33
- Area Vocational School--34
- Two-Year Technical Institute--16
- Junior College--18

Enrollment by States:

Tennessee	19	Florida	8
Kentucky	15	West Virginia	7
Mississippi	14	North Carolina	5
Virginia	12	Georgia	5
South Carolina	11	Alabama	5

1967 In-Service Institute Participants

Mr. Roger M. Adkins
New River Voc.-Tech. School
Third and Downey
Radford, Virginia

Mr. Gilbert A. Atkins
Mercer County Voc. School
Bluefield, West Virginia

Mr. Bennie R. Battle
Austin High School
1801 E. Vine Avenue
Knoxville, Tennessee

Mr. Carol B. Baughman
Sumter Area T. E. C.
Guignard Drive
Sumter, South Carolina

Mr. Kenneth Blair
Lafayette Vocational School
Springhill Road
Lexington, Kentucky

Mr. Harold R. Blount
E. C. Glass High School
Memorial Avenue
Lynchburg, Virginia

Mr. Conrad E. Brandt
Oconee County High School
Box 367
Walhalla, South Carolina

Mr. Arthur Brown
F. W. Olin Voc. High School
1054 Avenue F
Birmingham, Alabama

Mr. Elmo Burke
Mayo Vocational-Tech. School
Third Street
Paintsville, Kentucky

Mr. Albert R. Campbell
Jones County Junior College
Ellisville, Mississippi

Mr. Ewing E. Cannon
Milan High School
Milan, Tennessee

Mr. William L. Caraway
Greenville Tech. Educ. Center
P. O. Box 5616 Station "B"
Greenville, South Carolina

Mr. Mike Carty
Bristol Sullivan Tech. School
McDowell Street
Bristol, Tennessee

Mr. Oscar Chambers
Raleigh County Voc.-Tech. Center
229 Second Street
Beckley, West Virginia

Mr. Vonnie M. Church
Ashland State Voc.-Tech. School
4100 Winchester Avenue
Ashland, Kentucky

Mr. Joseph A. Cipriano
St. Petersburg Junior College
6605 Fifth Avenue
St. Petersburg, Florida

Mr. Daniel R. Coachman
F. W. Olin Vocational School
1054 Avenue F.
Birmingham, Alabama

Mr. Henry N. Coleman
Sadie V. Thompson High School
1038 Ext. N. Union Street
Natchez, Mississippi

Mr. Winton I. Cook
Richard Arnold High School
1810 Bull Street
Savannah, Georgia

Mr. Adolphus M. Coward, Jr.
Thomas Edison High School
5801 Franconia Road
Alexandria, Virginia

Mr. Miles N. Crawford
South Charleston High School
Third Avenue and C Street
South Charleston, W. Va.

Mr. Harold R. Culnon
Central Carolina Tech. Inst.
Route 2, Box 27, Kelly Road
Sanford, North Carolina

Mr. Waddell Cummings
Booker T. Washington High School
715 S. Lauderdale Street
Memphis, Tennessee

Mr. Homer C. Currence
Mount Vernon High School
8333 Richmond Highway
Alexandria, Virginia

Mr. Lewis W. Curtis
McMinn Central High School
Englewood, Tennessee

Mr. William R. Davis
Utica Junior College
Utica, Mississippi

Mr. James E. Dean
George C. Marshall High School
Route 7
Falls Church, Virginia

Mr. Donald M. Dexter
Hinds Junior College
Raymond, Mississippi

Mr. William G. Eubanks
Lenoir County Community College
P. O. Box 188
Kinston, North Carolina

Mr. Ralph H. Evans
Memphis Tech. High School
1266 Popular Avenue
Memphis, Tennessee

Mr. James W. Fowler
North Virginia Community College
3443 South Carlyn Spring Road
Falls Church, Virginia

Mr. Vernon J. Gelarden
Owensboro Area Vocational School
1501 Frederica Street
Owensboro, Kentucky

Mr. Elbert M. Gilbert
Lee County Vocational School
Ben Hur, Virginia

Mr. Johnny A. Goforth
Rule High School
Knoxville, Tennessee

Mr. Henry Greene
Bradford-Union Training Center
Temple Avenue
Starke, Florida

Mr. Robert M. Greer
Raleigh County Voc.-Tech. Center
229 Second Street
Beckley, West Virginia

Mr. Lyman R. Gullett
Tilghman Voc. School
2400 Adams Road
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Mr. Marion P. Guthrie
East Central Junior College
Decatur, Mississippi

Mr. Leslie M. Hamilton, Jr.
Tennessee Institute of Elec.
4711 Old Kingston Pike
Knoxville, Tennessee

Mr. Carl E. Hinds
Marshall County High School
Old Columbia Highway
Lewisburg, Tennessee

Mr. Homer W. Hinton
Parker High School
Woodside Avenue
Greenville, South Carolina

Mr. Benjamin F. Hoffman, Jr.
Pearl River Junior College
Poplarville, Mississippi

Mr. Jesse E. Holman
Virginia State College--Norfolk Division
2400 Corprew Avenue
Norfolk, Virginia

Mr. Owen P. Holmes
Brevard Junior College
Clearlake Road
Cocoa, Florida

Mr. Kenneth R. Howard
Murray Voc. High School
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Mr. James A. Humberstone
Dixie Hollins High School
4920 62nd Street
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Mr. Jack L. Hunter
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Mr. Ralph S. Jensen
Lyman High School
Longwood, Florida

Mr. Robert E. Jolly
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633 W. Washington
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Mr. Loren R. Lane
Hinds Junior College
Raymond, Mississippi

Mr. Robert G. Lane
Washington Co. Tech. School
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Mr. Raymond C. LaPrade
Chipola Junior College
Marianna, Florida

Mr. John W. Luetgens
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Mr. Russell H. McDaniel
1215 Guthrie Avenue
Durham, North Carolina

Mr. Carl K. McDougald
Upson Co. Area Voc. Tech. School
Highway 19
Thomaston, Georgia

Mr. Rufus C. Mason
Holmes Junior College
Goodman, Mississippi

Mr. Kenneth E. Mathieu
Northeast Miss. Jr. College
Booneville, Mississippi

Mr. James C. Miller, III
Tuscumbia Board of Education
Winston House
Tuscumbia, Alabama

Mr. Norman Miller
Mayo State Voc. School
Paintsville, Kentucky

Mr. William C. Neel
Murphy High School
100 S. Carlen Street
Mobile, Alabama

Mr. Willie A. Newton
Spartanburg Co. T. E. C.
Box 4386
Spartanburg, South Carolina

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Palm Beach Co. Voc. School
810 Gardenia Street
W. Palm Beach, Florida

Mr. John E. Oakes
Western Area Voc. School
Russellville Road
Bowling Green, Kentucky

Mr. William I. Parker
Central High School
Pickwick Road
Savannah, Tennessee

Mr. William J. Parks
Copiah-Lincoln Jr. College
Wesson, Mississippi

Mr. David O. Payne
Upson County Area Tech. Voc.
Thomaston, Georgia

Mr. John R. Pedro
Raleigh County Voc. School
229 Second Street
Beckley, West Virginia

Mr. William A. Pittman
McDuffie High School
1225 McDuffie Street
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Mr. Lester O. Quarles
Morristown High School
James Street
Morristown, Tennessee

Miss Pamela J. Quick
Spartanburg Co. Tech. School
P. O. Drawer 4386
Spartanburg, S. Carolina

Mr. Terrell F. Rayburn
Hinds Junior College
Raymond, Mississippi

Mr. John D. Reece
Richland T. E. C.
316 Beltline Boulevard
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Mr. Charles V. Rogers
South Charleston High School
"C" Street and Third Avenue
South Charleston, West Virginia

Mr. Norris N. Romine
Riverside High School
865 Third Street
Chattanooga, Tennessee

Mr. Linis H. Russell
Central High School
Backvalley Road
Coalfield, Tennessee

Mr. Clarence E. Sanders
South Georgia Tech. Voc. School
P. O. Box 560
Americus, Georgia

Mr. Wayne C. Scott
Tilghman Area Voc. Tech. School
2400 Adams Road
Paducah, Kentucky

Mr. Howard C. Shehane
Columbus Technical School
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Mr. Donald E. Singleton
Hazard Area Vocational School
647 Main Street
Hazard, Kentucky

Mr. Earl Sisco
Copiah-Lincoln Jr. College
Wesson, Mississippi

Mr. Theodore R. Slater
633 W. Washington Street
Petersburg, Virginia

Mr. Ronald E. Sleeper
Fayetteville Tech. Inst.
Box 5236
Fayetteville, N. Carolina

Mr. Edwin L. Smith
Copiah-Lincoln Jr. College
Wesson, Mississippi

Mr. Ted C. Smith
Blowing Springs Voc. School
Route 2
Clinton, Tennessee

Mr. John A. Sopko
Hume Fogg Tech. High School
700 Broad Street
Nashville, Tennessee

Mr. Turner B. Southard
Haywood Co. High School
Grand Avenue
Brownsville, Tennessee

Mr. Howard T. Sowders
Western Area Vocational School
Russellville Road
Bowling Green, Kentucky

Mr. Hilton J. Swindell
Rowan Tech. Institute
I-85 at Klumac Road
Salisbury, North Carolina

Mr. Vogal Tackett
Mayo State Voc. School
Belfry, Kentucky

Mr. James D. Taylor
Point Pleasant High School
2312 Jackson Avenue
Point Pleasant, West Virginia

Mr. William H. Thomas
Talladega High School
414 Oak Street
Talladega, Alabama

Mr. Hubert L. Tucker
Ashland State Voc.-Tech. School
41st and Winchester Avenue
Ashland, Kentucky

Mr. John S. Tucker
Peninsula Voc. Tech. Center
Hampton, Virginia

Mr. Malcolm H. Venable
Northwest Junior College
Senatobia, Mississippi

Mr. Alvin F. Weigel
Brevard Junior College
Cocoa, Florida

Mr. William J. White
Murray Voc. High School
3 Chisolm
Charleston, South Carolina

Mr. Joseph E. Whitfield
Harland State Voc. School
Ball Park Road, Highway 421
Harlan, Kentucky

Mr. Benjamin F. Witherspoon
Riverside High School
865 E. Third Street
Chattanooga, Tennessee

Mr. Jimmie C. Bentley
Mayo State Voc. School
Paintsville, Kentucky

APPENDIX C

EVALUATION AND ADVISORY CONFERENCES

1966 AND 1967 IN-SERVICE INSTITUTES

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EVALUATION AND ADVISORY CONFERENCE

Summer 1966, Vocational-Technical
Teacher Training Institute

September 9-10, 1966

EVALUATION AND ADVISORY CONFERENCE ATTENDANCE
Summer 1966, Vocational-Technical
Teacher Training Institute
September 9-10, 1966

REVIEW PANEL

Dr. B. E. Childers
Regional Representative
Bureau of Adult and Vocational Education
U. S. Office of Education
Atlanta, Georgia

Charles M. Dunn
Assistant Commissioner for Vocational Technical Education
State of Tennessee
Nashville, Tennessee

Dr. Carl Lamar
Director, Kentucky Research Coordinating Unit
University of Kentucky
Lexington, Kentucky

Dr. William G. Loomis
Director, Vocational Education
State of Oregon
Salem, Oregon

Dr. Byrl Shoemaker
Head, Department of Vocational Education
State of Ohio
Columbus, Ohio

Dr. Merle Strong
Assistant Director, Program Services
Division of Vocational and Technical Education
U. S. Office of Education
Washington, D. C.

IN-SERVICE TEACHER TRAINEES

Machine Shop and Fabrication Section

Elvin H. Adams, Jr., Teacher
Virginia Peninsula Vocational-Technical Education Center
Hampton, Virginia

Mechanical Technology and Drafting Section

Curtis Hixon, Teacher
West Kentucky Vocational School
Paducah, Kentucky

Industrial Electronics Technology and Maintenance Section

Paul M. Starnes, Teacher
St. John's River Junior College
Palatka, Florida

TRAINING AND TECHNOLOGY STAFF MEMBERS

University of Tennessee

Dr. Donald E. Maurer
Director of Education

Gerald LaBorde
Director of Guidance and Counseling

Terrance Powell
Instructor

Union Carbide Corporation-Nuclear Division

J. Leo Waters
Project Director

F. C. Lowry
Assistant Project Director

Ralph Pearson
Training Director

Frank W. Booth
Electronics Instructor

Richard E. Dew
Machine Shop Instructor

Joseph E. Miller
Drafting Instructor

Oak Ridge Associated Universities

William G. Pollard
Executive Director
Oak Ridge Associated Universities

Wendell H. Russell
Project Director

William R. Ramsay
Head, Office of General Services
Oak Ridge Associated Universities

John C. Hamel
Training and Experimentation Coordinator

Donald J. Vernine
Project Administrative Officer

James L. Echols
Project Information Officer

EVALUATION AND ADVISORY CONFERENCE
SUMMER 1966
VOCATIONAL-TECHNICAL TEACHER INSTITUTE

September 9-10, 1966
AGENDA

Friday
September 9

9:00 a.m.	Welcome	Pollard
	Purposes of Conference and Outline of Questions Which Need to be Answered	Ramsay
	Purposes of TAT Project and Objectives of Teacher Institute	Russell
	Institute Activities and Education Program	
	Recruitment and Selection	Russell
	Staff and Procedures	
	U.T.	Maurer
	Carbide	Waters
	BREAK	
	Course Content	
	U.T.	Powell
	Carbide	Pearson, Booth, Dew, Miller
	Guidance and Counseling	LaBorde
12:00 noon	LUNCH	
1:30 p.m.	Participant Response	Hamel
	Survey Results	Hamel
	Participants' Views	Adams, Hixon, Starnes
	BREAK	
	Plans for Follow-Up	Hamel
	Questions and Discussion	
4:30 p.m.	Adjourn	
6:00 p.m.	DINNER Ridge Room - Holiday Inn	

Saturday
September 10

9:00 a.m.	Summarization	Hamel
	Reaction by Individual Review Panel Members	
11:30 a.m.	Adjourn	

C6/

Vocational-Technical Teacher Institute

Evaluation and Advisory Conference

This conference is designed to provide information for an independent evaluation by leaders in the vocational-technical education field of the Training and Technology Project's 1966 summer In-Service Teacher Institute. The Institute's background, setting, objectives and activities will be described in detail. Vocational-technical educators present are invited to question any speaker at any time to clarify specific points in the presentation. A period for questions and discussion on a broader scale will be provided prior to the end of the conference.

From the information presented it is hoped that the conference members will provide independent analyses and evaluations in writing to O.R.A.U. These should include innovations or alterations that may be incorporated into next summer's institute and other programs that may evolve.

It is suggested that the educators consider these questions in their evaluations:

1. What are your impressions of the concept of training vocational and technical teachers in an industrial setting?
2. Was the group of teachers which attended the institute representative of the teachers in the vocational areas?
3. Were the courses in vocational and technical education, presented by the University of Tennessee, adequate for the needs of the training group?
4. Was the technical material presented in lectures and laboratory by Union Carbide Corporation adequate for the needs to the group?
5. Was there a proper relationship and balance between the technical and education material?
6. What comments might be offered on methods of presenting the material?
7. What comments may be offered on the guidance and counseling program?
8. What comments may be offered on the coordination of the program?
9. What applications does the institute hold for similar institutes elsewhere?
10. What developments of this Institute warrent publication?

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

B. E. Childers
Regional Representative of Bureau of Adult and Vocational Education
Department of Health, Education and Welfare
Atlanta, Georgia

EVALUATION AND ADVISORY CONFERENCE
Summer, 1966
VOCATIONAL-TECHNICAL TEACHER INSTITUTE

Special commendation should be given to the Oak Ridge Associated Universities, Union Carbide Company, and the Atomic Energy Commission for their forthright evaluation and comments regarding the considered value of the program in training and technology for the summer of 1966. It was obvious that a significant amount of work had gone into the preparation for the evaluation, as well as that of the program for the past summer. The program for the evaluation was very well outlined, well documented, and the materials provided were very effective in the effort to make possible an adequate evaluation. The committee members selected for the evaluation came from a diversification of areas and therefore could not be considered to have special interests nor concern for the specific project; the evaluation should therefore be of special significance to the future of the program.

Special provision should be made by the technical and technology project personnel to see that all of the evaluations made by the individuals involved in the evaluation conference be included in a published summary evaluation of the Technical and Technology Project. Special evaluation should also be made by the individual teachers involved in the project such that these could be included in a final evaluation to be made to the Bureau of Research of the U. S. Office of Education which funded this phase of the project.

MODELS FOR MEASUREMENT OF THE PROJECT

I. Objectives of the Program. The objectives of the program are most commendable and most significant and worthwhile and should be considered as a guide regarding similar projects in the future. This approach is most commendable in which the industrial setting of a production center is utilized for the provision of materials and services for teacher education. This is a traditional concept and has been utilized in many instances in the past, however, not on an organized basis with group sessions for instruction rather than individual instruction on specific items of equipment within an industrial complex. The concept of a group setting in which the students can share experiences and opportunities is excellent.

II. The Best Situation for Such a Program. The ideal situation under which teacher education in-service training could be provided would be an instance in which an industrial setting is used for personnel having instructional responsibilities for individual programs to move into the industrial complex and work with one specific individual for an extended period of time. The ideal would be that each five year period this teacher would be allowed to spend one year in an industrial setting actually doing production work and upgrading himself on all the newest complexities of such program. This period would be directed toward a balanced period of theory and practice for effective experience. The emphasis would be on teacher development rather than production schedules. Measured under this ideal the situation at Oak Ridge could not be considered ideal because of the short period of time which was available for these trainees to be in the program and the fact that the students were not available for individual instruction through any part of their program. Obviously the number of instructors were not available for these students to be receiving a 1 to 1 ratio of instructional competency or improvement, even during the short period of time in which they were there. Production and security limitations prevented the ideal in instruction and teacher development.

III. The Usual Training Program. Normal practice for in-service training for teachers of the type involved in this project is periodic summer release time teachers are allowed to return to an industry for a summer session; normally from an eight to twelve-week period. Instances of this type are generally on a voluntary basis and frequently because of time commitments to summer classes or other sessions, or because of financial obligations teachers are unable to participate in such training programs. The opportunity provided by the training and technology project is most commendable because it does allow financial remuneration for people for a period of time in which they can return to an industrial setting and receive actual up-to-date industrial experiences within an industry.

IV. Institutional Costs. A factor which was not considered in the evaluation and no information was provided to the evaluation committee was the actual cost of such project. The writer's experience has indicated that this is most significant and such projects are not feasible at the cost involved in this project if such were underwritten by a local or state educational agency. Under normal circumstances the local educational agency or state educational agency does not have the financial resources that would provide such services on a permanent basis.

QUESTIONS REQUESTED TO BE CONSIDERED BY THE OAK RIDGE ASSOCIATED UNIVERSITIES IN THE EVALUATION PROCESS

1. What are your impressions of the concept of training vocational and technical teachers in an industrial setting?

The most frequent means used for training vocational teachers is the use of industrial situations for such personnel. Normally such personnel are involved with an extended period of institutional training in theoretical concepts of the program which they are to enter and then get an extended period of on-the-job training prior to their actual entering an occupational instructional situation as a teacher. This concept of training has been utilized in most trade and industrial situations since the beginning of an effective trade and industrial program. The only effective means under which such people can receive adequate trade skills is through an industrial setting. No artificial situation could be developed at any reasonable cost under which it could be done otherwise. In-service training should follow the same criteria as that of conventional programs as provided in this situation. The concept of training and the utilizing of the industrial situation is an excellent means therefore of in-service stimulation of training. The strongest concept of the program, however, is the fact that the teachers were given financial remuneration and institutional instruction while a part of the in-service situation and that it became a controlled situation for training experiences rather than an industrial production situation. One weakness identified within the project was that industrial production had to take precedence over that of training. This did not lend itself to as effective a situation as might otherwise be desired.

2. Was the Group of Teachers which Attended the Institute Representative of the Teachers in the Vocational Area?

In an evaluation of the tests which were given to the teachers it could be the general assumption that the teachers generally were representative of the teachers in such areas. However, the extremely low scores of some of them on the High School Graduation Examination indicates that some of them were very inadequately prepared. However, I would question the fact as to whether this was because of the inadequacy of the teacher in his teaching field or the fact that the teacher was not actually in an in-service situation which was his teaching field. A number of the selectees made at the time of selection were made on criteria other than actual improvement of instructional competency because some of the people were selected because of the need as identified in the original research proposal that a certain percentage of the trainees be Negro. Several Negro applicants were accepted because of the fact that they were Negro rather than because they actually needed any improvement of program. As per example, certain teachers from Georgia, Virginia, and other universities that were selected and given preference in the training programs who actually did not teach in such areas. The shortness of the time involved for the selection of these teachers was of critical importance and this was caused by the basis of funding. Future programs should not involve this problem because of funding which I would assume would be made much earlier. A major recommendation would be that funding in the future be made in adequate time that selections could be made enough in advance that closer controls could be placed on the teachers selected for the training program and more teachers have opportunity to attend.

3. Were the Courses of Vocational and Technical Education Presented by the University of Tennessee Adequate for the Needs of the Training Group?

From the responses given by many of the trainees and those people at the evaluation conference I would question that the courses provided by the University were adequate for the needs of the training group. It seemed that the criteria for determination of which course a student took was made on the basis of which courses the university elected to offer rather than on what the student's actual needs were. Future activity in this area should center around a greater analysis of individual students needs and it would be better to meet these needs on a project basis. The students could select a problems course rather than being provided limited institutional instructional programs. There seems to be significant diversity of opinion on the part of the trainees regarding the degree of success of the education courses. Inasmuch as the prime purpose of the institute was to provide an industrial setting and the combined use of the University of Tennessee personnel, greater emphasis might be made toward selecting instructors for a program who have been involved in actual trade instructional situations and been outstanding in their area. Inasmuch as the committee did not have the opportunity to identify in the evaluation conference the teachers' competencies nor have the opportunity to talk with any of the teachers, an adequate evaluation of the success of this course could not be made. A very close look should be made, however, of the teachers and of their competencies they can offer the students in any future such programs.

4. Was the Technical Material Presented in the Lectures and Laboratory by Union Carbide Corporation Adequate for the Needs of the Group?

Because of the diversity of backgrounds of personnel involved in the group I would question whether the technical material presented was adequate for the needs of the group. In some cases, individual trainees needed more experience on machines while in other instances they may need more theory information. This would indicate the reason for the diversity of the answers given in the exit questionnaire to the trainees. I would suggest that a more effective training program would be that rather than having all trainees geared to an exacting program that each individual trainee's needs be identified and he be given more specific instruction within the areas of his greatest needs. This could be provided by a more effective evaluation at the beginning of a project to determine whether the individual felt his needs were greater in the theoretical or in the practical aspect of his program. There seemed to be a rather limited application of the practical aspect of the programs, especially in the machine shop area; the reverse seems to be true of the other areas.

The strongest feature of the program was that there were people specifically involved in the technical aspects of the program available to provide special technical instruction to the group. Even though this was done in a group session, very little seemed to be done in individual counseling sessions or opportunities for the trainees to get with instructors or workers in their working situation. More of an individualized approach to instruction would be more effective in this case. The trainees indicated a rather low regard for the instructional competencies of the technical people. This is frequently true of many technical and trade personnel. Even though they know their subject matter, frequently they are incapable of communicating it as effectively as a professional educator. This is where the balance between the two programs becomes most crucial in regard to the teacher.

5. Was There a Proper Relationship and Balance Between the Technical and Educational Material?

No adequate analysis could be made of the degree of proper relationship balance because this varied from student to student. The weakest facet was that individual differences of students were not taken into account but an average of students or above average of students seemed to be used as the criteria for determining how much technical and how much educational material might be provided. Inasmuch as most of the trainees involved in this program were professional trade or technical educators with varying degrees of background and experience in the industrial and the educational setting, no single program could ever be provided to meet the needs of 60 different students on exactly the same course of study. The only means under which this could be done would be that individual analysis be made of each student and that each student makes a self-analysis. In most cases where professional trade instructors are involved we will find that teachers generally can recognize what their variances and weaknesses are. This could effectively be done through an adequate counseling program prior to the entry into the classwork, before the beginning of the actual institutional phase of the program. In some cases there was a proper relationship and balance as was identified in the final questionnaire, while in other cases there was a rather significant lack of balance between the programs based on student needs. The prime control as to what the relationship should be must be based on an individual's needs and not what someone thinks an individual needs.

6. What Comments Might be Offered on Methods of Presenting the Material?

The general consensus of the trainees seemed to be that there was a lack of practical experience on their part and adequate opportunity to become involved. This is especially true in the machine shop field which is primarily a skill development area for the majority of the trainees were involved in either high school level programs or one year post high school programs. These trainees in turn needed a great deal more experience and practice on machines than they did on theory and theoretical concepts and backgrounds of such programs. The people in electronics seemed to feel that the major interest is in theory and inasmuch as the normal ratio in the electronic field is 70% theory to 30% practical knowledge, it would seem that the major emphasis in the field of electronics should be in the field of theoretical achievement and improvement. In the field of drafting the primary emphasis here should be equally balanced between that of theory and background and that of practical experience. Therefore a 50-50 ratio might be more effective here.

7. What Comments May be Offered on the Guidance and Counseling Program?

There seemed to be an ineffectual overbalance of an extended period of guidance and testing at the beginning of the program. Many of the students' attitudes were as a result of beginning their training program after this extended period of guidance and counseling. These students indicated a rather low value toward the benefits from such a program. The guidance and counseling program could much more effectively be provided by an adequate balance throughout the entirety of the program rather than trying to centralize so much of it in the initial phase. A more effective system of guidance and counseling might be provided by the individual technical people in the industry rather than by professional counselors employed outside of this group. Here again, consideration must be given to the fact that these are professional educators; therefore, their individual personal problems should not be nearly as problematical as that of the average trainee at entry trade level.

8. What Comments May be Offered on the Coordination of the Program?

The primary purpose and means of coordination is an effective system of communication among all personnel involved. I wonder if there was an adequate means of communication provided between the trainees and the technical instructors and the professional instructors at the university. The most frequent weakness of all institutional training programs is the lack of an effective means between all agencies for continual communications. Informal sessions where the technical and professional instructors and the trainees have an opportunity to get together and sit down and discuss mutual problems, concerns, and situations would be most helpful. Security problems seemed to provide some limitations on the part of some personnel and their opportunity to secure additional data or contact with other people in their own program. There did not seem to be an adequate and effective means of communication between the personnel from the University of Tennessee and the technical instructors involved in the project.

Generally, the Oak Ridge Associated Universities seemed to do an excellent job of coordination of activities among all personnel involved. One of the major facets involved in the original proposal was the ability to coordinate activities of an industrial situation, a Federal agency, a State agency, and a university; as well as that of an agency of organized labor. Considering all of the significant problems involved I believe the Oak Ridge Associated Universities has done an outstanding job of the coordination of such activities among involved agencies.

9. What Application Does the Institute Hold for Similar Institutes Elsewhere?

Special consideration might be made from other institutes of this nature. Such programs should take special consideration of individual needs of students rather than trying to emphasize group application for such programs. Similar institutes could be held on a smaller unit basis in which groups of less than class-size of 20 may be utilized within an industrial setting with more emphasis on individual association with tradesmen and personnel involved in the production aspects of industry.

10. What Developments of the Institute Warrant Publication?

A special significance that would be of benefit to other institutes in the future would be a publication establishing specific guidelines for effective coordination, development, and implementation of such programs. Such a publication could be used very effectively for other institutions and industries in the development of similar programs. Special emphasis should also be given regarding the cost of the project because the degree of cost in such a project will be of major significance and importance.

SPECIAL COMMENTS REGARDING OTHER ASPECTS OF THE OAK RIDGE ASSOCIATED UNIVERSITIES' VOCATIONAL-TECHNICAL TEACHER INSTITUTE

Physical facilities for the University phase of the training program appeared quite limited. One of the advantages of having institutional instruction in a university setting is that the availability of adequate library and classroom facilities. This did not seem to be the case within this industrial setting and was one of the weaknesses of the institutional phase of the program. Future considerations might be given to the institutional training being handled separately from that of the industrial training program and the training and technology program be limited exclusively to technological and skill training as a part of the improvement in instructors and eliminate the university involvement in this part of the instructional program. Or if not eliminated, that it be done in another situation. A special weakness of the project was a lack of adequate library facilities for research on the part of the trainees and a lack of instructional audio-visual development materials was emphasized in a part of the evaluation. The institute for next year might be more effectively done if classroom space were provided outside of the Union Carbide facilities because of the security limitations and the lack of space. Some of the classroom space was very cramped and a special question is raised regarding an area for study space for trainees. The use of the Junior High School at Oak Ridge or the High School at Oak Ridge might be considered as a possible source for classroom space in the future. This would eliminate the necessity of long travel times between Oak Ridge and the University of Tennessee where facilities might be more readily available and acceptable for utilization. I believe there are training programs at Oak Ridge

High School in Drafting and Machine Shop which could be utilized to some degree for the utilization by personnel in the project. Many aspects of the program, especially the classroom aspect of it, offered no advantage to being held in the industrial setting rather than in a university setting. Consideration should be given that as much of this type of work as possible be moved outside of the industrial setting. The prime advantage of an industrial setting is the laboratory provided and unless time can be provided on actual industrial equipment for trainees where they can have the opportunity to develop skills, skill habits, safety procedures in industrial systems, techniques and methods, then there is no significant advantage to handling such a training program in an industrial setting.

One of the weaknesses of the evaluation committee is that there was not an opportunity at any time by the evaluation committee to actually participate in any of the classroom sessions during the project. No completely adequate and effectual evaluation can be made unless the evaluation personnel are actually involved in the project. Much of the material which was received was as a result of evaluations already made by coordinating staff personnel rather than receiving the actual materials which were given by the trainee. A strength of the evaluation technique, however, was that complete quotations were taken from the trainees' reactions. There seemed to be no special effort made to delete or eliminate any derogatory statements made by trainees. One of the most significant facets of the report itself is that there appeared to be a reasonable balance among the trainees involved in the project and their reactions to the program. For instance, there were some that were highly satisfied while others seemed to be greatly dissatisfied. This indicates, at least to some degree, that there was an effective balance either among the training or among the trainees.

Future suggestions for like programs might also include the provision of library services or library for the utilization of the trainees. One item which is frequently not available to the instructor in his teaching situation is the availability of an adequate technical library which is a normal situation within an industrial setting. The provision of materials of this type to the trainee or at least the availability of such materials would greatly enhance the training program and improve the applicability of the trainees to their industrial setting. I believe the utilization of an industrial setting is an excellent means of providing additional in-service training to teachers. A major question to be answered is whether such training could not have been provided on a more economical basis, under some other system rather than the one under which this one was provided. Future considerations of institutes of this type should bear this in mind as a major facet in such training programs.

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

Charlie M. Dunn, Asst. Commissioner
Vocational-Technical Education
State of Tennessee

General Observations

This independent evaluation of the Vocational-Technical Teacher Institute is made with the view of making some contributions toward improvements which might be made in the second Institute planned for the summer of 1967.

The need for vocational-technical teachers to keep abreast of developments within their respective technologies has long been recognized by vocational educators. Evidence of this can be found in the State Plan requirements and encouragement from those responsible for programs. This need has increased sharply during the past several years.

The method of meeting the above stated need is not as easy as identification of the need. Perhaps there is no "model" method of updating knowledge and skills. The concept upon which the Institute was based and the experiences gained can serve to strengthen and improve other methods.

Personnel representing the several agencies cooperating in the project are to be commended for the very fine spirit evidenced from the beginning of the project, their willingness to seek suggestions and make modifications.

The following comments are made on the ten questions presented the evaluation group:

1. What are your impressions of the concept of training vocational and technical teachers in an industrial setting?

   The concept is sound. It is not a new concept but is inter-woven with standard practice of selection and developing vocational-technical personnel in vocational-technical education.

   The method of applying the concept, that of planned and organized activities for updating teachers in an industrial setting, is unique in Tennessee as is the method of financing.

   There was an apparent lack of understanding between educators and industrial personnel of what the participants' needs were. The writer's knowledge of participants from his own State indicates needs which cannot be met by observation, exposure, and lecture. This probably is true in other states.

2. Was the group of teachers which attended the Institute representative of the teachers in the vocational areas?

   Background information on the teachers was not available in sufficient detail to determine whether they were representative. In questioning some of the teachers on two visits to the Institute and in view of the three fields for which training was offered, the selection process is strongly questioned.

   It would appear that selection of participants having needs which could be met with available facilities would be easier than attempting to modify the training program upon learning the needs were different than assumed earlier.

It is recommended that selections for the next Institute involve those who know the teachers' needs best. Each teacher is supervised by either a local or regional director or supervisor, whose prime function is that of improvement of instruction and who is well aware of teacher weaknesses.

It is further recommended that such personnel be involved in preplanning and pre-selection activities with the project staff so better understandings may be developed.

3. Were the courses in vocational and technical education, presented by the University of Tennessee, adequate for the needs of the training group?

   A number of teachers stated they had previously taken the courses presented by the University of Tennessee. Materials presented to the Evaluation and Advisory Committee showed unfavorable attitudes and criticism of the courses. There was considerable change in attitudes during and at the close of the Institute. This change can be attributed to a large degree to redirection and modifications made by University personnel.

   The advisability of offering standard industrial education courses in conjunction with the technical phase of the Institute is questioned. Such courses could be conducted more effectively in facilities designed for such.

   It was explained that the industrial education courses were offered to provide opportunity for teachers to meet course requirements at the time they were enrolled in the technology program. However, the fact that teachers were enrolled in "repeat" courses and registered their reactions poses questions on the selection process and the advisability of offering these courses.

   It is suggested that provisions be made in the next Institute for group discussion or a special designed course to analyze technology experiences and relate such to each teacher's specific field of teaching.

4. Was the technical material presented in lectures and laboratory by Union Carbide Corporation adequate for the needs to the group?

   Some review of topics presented the teachers by Union Carbide Corporation was made. Such technical material is highly desirable and necessary on the part of vocational-technical teachers, particularly technical teachers.

   There was evidence that very little time was devoted to activities which would allow teachers to actually perform operations and learn new techniques and skills. A number of teachers indicated the desire to practice some of the things they saw. Much of the information presented in lectures could have been acquired through personal reading.

   It is suggested that more time be devoted to demonstration of operations followed by practice and follow-up.

5. Was there a proper relationship and balance between the technical and education material?

   The technical material presented by Union Carbide appeared to be related to a fairly high degree to the technologies. There did not seem to be proper balance since the technical material appeared to be on the heavy side as evidenced by the desire of teachers for more experience in the shops and laboratories.

   The relationship and balance with respect to the education material does not appear to be a significant matter. The reader is referred to comments under question three above.

6. What comments might be offered on methods of presenting the material?

   The method of presenting technical materials by the lecture method to the extent done during the Institute is questioned. Reference is made to remarks by teachers and persons who met with the committee. No evaluation could be made by the committee on effectiveness of presentations.

   There was little evidence of use of the demonstration method with the presentation of technical data as it applied.

7. What comments may be offered on the guidance and counseling program?

   It would appear that the amount of time devoted to this function at the beginning was too much. With improved selection procedures this time could be reduced considerably.

   It seemed there was considerable effort made on the part of all concerned to correct and re-direct during the Institute. This probably accounted for much of the time devoted to counseling services.

   It is recognized that delay and difficulty in getting facilities arranged contributed to the problem.

8. What comments may be offered on the coordination of the program?

   The entire staff is to be commended on the fine spirit of cooperation and apparently the overall coordination was good.

   It is the opinion of the writer that more effort was needed relative to coordinating activities in the shops and laboratories with classroom activities.

9. What applications does the Institute hold for similar Institutes elsewhere?

   No doubt there are a number of things to be learned from the Institute which can and should be applied to similar efforts to upgrade teachers.

   The availability of industrial facilities for use in other places and the cost of financing are problems to be faced.

10. What developments of this Institute warrant publication?

Publication relative to details of the Institute should be limited at this time. General information relative to the concept and cooperative efforts merit wide circulation.

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

Carl F. Lamar, Director
Kentucky Research Coordinating Unit
University of Kentucky
Lexington

Evaluation of Vocational - Technical
In Service Teacher Training Institute
Oak Ridge, Tennessee

Observations Regarding the Conference

It was my pleasure to serve on the review panel selected to evaluate the "Vocational - Technical In-Service Teacher Training Institute" conducted by the University of Tennessee, Oak Ridge Associated Universities, and the Oak Ridge Y-12 Plant operated by Union Carbide Corporation at Oak Ridge, Tennessee, June 27 - August 26, 1966.

Perhaps the evaluation could have been more objective if members of the review panel had the opportunity to observe the institute while it was in operation. The quality of instruction, participation of students in the instructional program, and the educational environment are important aspects of any teaching-learning situation. These elements can be most accurately assessed when actually observed. However, the people who operated the Institute are to be commended for the thorough job done in collecting the information needed to assess the institute, and the openness and frankness in which they presented their impression and findings to the review panel.

The Evaluation Conference was thoroughly planned and well conducted. All aspects of the program were completely discussed in a direct and forthright manner. It should be extremely helpful in giving proper directions to program improvement.

Orientation to the Assignment

As explained to the review panel the Training and Technology Institute was proposed as a Manpower Training Demonstration Project. It is to be repeated in 1967, and presumably afterwards, and at other places, if deemed successful and feasible.

The purpose of the Training and Technology Project was to combine the staffs and facilities of industry and universities, under the coordination and management of Oak Ridge Associated Universities, to conduct research in manpower training, and experimentation in a demonstration project, designed to improve the teaching effectiveness of industrial education teachers.

The specific objectives of the project were stated as follows:

1. To upgrade vocational and technical education teachers by exposing them to advanced innovations in technology and practice.

2. To carry on experimentation designed to close the gap between classroom teaching and industrial practice.

3. To develop a model program that will improve the instruction and training of vocational and technical teachers.

The review panel was asked to make a creative review and not just pass judgment on the institute. Panel members were asked to present their reactions individually and not as a group. As an evaluation must be made in terms of certain accepted standards, the following were suggested.

1. Objectives of the project as indicated in the proposal.

2. An ideal program as conceptualized by the panel member.

3. Realistic understanding of normal programs operating in the cooperating states.

Some Guidelines Established for this Evaluation

Perhaps at this point it is desirable to outline some points of view held by this panel member that have served as guidelines in appraising this project. The following statements are viewed as elements of a sound teacher education program that must be understood and accepted by those who plan and conduct such programs.

1. Recognize the characteristics of a good teacher — the product that the teacher education program is intended to yield.

2. Understand the accepted levels at which teachers may begin teaching with the expectation of good results.

3. Understand the needs of teachers in attaining accepted standards of full certification and in maintaining the competencies required for effective teaching.

4. Recognize the fact that teachers are concerned about several requirements that relate to their status as teachers when they consider their needs for teacher education; namely, requirements for teacher certification and degree objectives, maintenance of up-to-date knowledge and skills needed for effective teaching, and development of an accepted professional image which influences pay, promotion and teaching tenure.

5. Accept the fact that a sound teacher education program must be based upon the needs of the students to be enrolled. Such programs as training institutes, conferences, seminars and workshops should fit into the overall teacher education plans of the students enrolled.

6. Clearly conceptualize a teacher-education program designed to turn out the kind of teachers needed which is understood and accepted by everyone responsible for carrying it out. It should make adequate provisions for those aspects of the teachers needs.

   a. General or basic education

   b. Occupational experience (measured in terms of competencies acquired)

   c. Technical education (knowledge of subject to be taught)

   d. Professional education (knowledge of educational processes)

7. Understand the teaching-learning process. (especially those responsible for the instruction)

8. Formulate clearly stated teaching objectives related to the needs of the persons to be taught and the occupational areas in which they are to be employed.

9. Maintain a competent staff to carry out the program.

    a. Possess the technical knowledge needed

    b. Be well grounded in the educational processes, including educational psychology, teaching methods, fundamentals of curriculum development, and vocational guidance.

    c. Be students of their job, participating in activities designed to improve their teaching competencies and enhance their professional growth.

10. Maintain appropriate facilities and equipment

11. Secure adequate financial support

12. Provide necessary ancillary services

    a. Administration and supervision

    b. Preparation of instructional materials

    c. Guidance services

    d. Research and development

    e. Program evaluation

    f. Communications

13. Maintain effective recruitment, selection, and placement procedures.

14. Maintain a permissive atmosphere conducive to effective teaching and learning.

The tremendous demand for industrial education teachers and the short supply now available makes it necessary to establish certification requirements for beginning teachers, at a level considerably below that deemed desirable for an adequately trained beginning teacher. Also, the evolving developments in science and technology which have changed the demands of industry and the requirements of the labor market call for teachers with new and varied competencies. There is greater need for technical knowledge which is not necessarily acquired through occupational experience. These conditions make it increasingly important that greater attention be given to in-service training programs planned to produce an adequate supply of teachers competent to provide quality instruction in vocational education.

It seems apparent that the resources of higher education and industry need to be combined and coordinated if adequate teacher education programs are to be developed, an adequate supply of competent teachers is to be secured, and well trained workers for the labor market are to be produced. This panel member is impressed with the possibility and feasibility of projects like this one serving a vital need in vocational education.

Evaluation of the Project

This evaluation is made on the basis of a thorough review and analysis of the project proposal, surveys conducted by ORAU, exit questionnaires, seminar schedule, teaching guides, periodic progress reports on the project, news releases, and verbal reports by the project staff and selected trainees who participated in the program.

The project proposal was well prepared and represents a sound approach to the in-service training of trade and industrial education teachers. It recognizes the significant needs of teachers for in-service education. The idea of combining the talents and resources of government, industry and universities in providing education and training programs to prepare competent teachers to staff vocational and technical programs in the cooperating states offers a lot of promise and should be thoroughly tested. The problem of providing technical instruction with the use of up-to-date and advanced equipment and facilities requires the cooperation of industry.

The questions that I raise regarding this project have been aired by the staff and students that participated in the project. I am stating them here because I tend to agree with them and believe they need attention if the project objectives are to be realized.

The observations and reactions that follow relate to the ten questions that were suggested to the review panel members for consideration in their evaluation. It is recognized that the delayed approval date for the project presented some serious handicaps in planning, staffing and recruiting trainees. Lead time for planning is a very important factor in operating a project of this nature. It has a significant bearing on all aspects of the program; especially, the employment of personnel, development of coordination among staff members, program development, and the selection of students. Evidently, most of the criticisms of the project could have been (and would have been) avoided if approval of the project had been given at the time requested in the proposal. The late approval date of the project delayed the employment of teachers and telescoped many aspects of the project. It also affected communications with the cooperating states in the recruitment and selection of trainees.

Question No. 1. What are your impressions of the concept of training Vocational and Technical teachers in an industrial setting?

I think the concept is sound and will work if those who develop such programs clearly recognize what the industrial setting has to offer and they take full advantage of the situation. The realistic industrial environment, opportunity to observe workers operating in the industrial setting, privilege of getting the experience in using up-to-date facilities and equipment, and opportunity to receive top level instruction from people who know what needs to be taught and how to teach it are indispensable. These attributes are not found in the university setting.

Training vocational education teachers in an industrial setting can provide many advantages if properly planned and carried out. The industrial setting offers many opportunities but it does not guarantee success. These questions need to be asked: "What kind of teachers are to be trained?" "What competencies do they need?" "Does the industrial setting provide the facilities and personnel required to make possible the kind of education and training needed by such teachers?"

The industrial setting makes possible observation and experience in the actual working environment, use of equipment and tools that students who are turned out of vocational schools will be expected to know how to use when they seek employment, and the advantage of having teachers who are up to date on the latest technology and skills employed by industry. These conditions are not available in the University.

An important question that must be answered relates to the ability of people in the industrial setting to assess the needs of vocational teachers as teachers and to provide effective instruction. Teaching is much more than just showing and telling. "Telling is not teaching." Teaching is directing the learning process. The learning process is a self-active process. It is the process whereby the learner through his own activities becomes changed in behavior (knowing behavior, believing behavior and doing behavior.) The technical teachers need in-service training, on a continuing basis, regarding the educational processes. Competence in this area is needed to reinforce their competencies pertaining to technological knowledge and manipulative skills. This was one of the activities planned for the teaching staff which was not carried out on a systematic basis.

Question No. 2. Was the group of teachers which attended the Institute representative of the teachers in the vocational areas?

The group of teachers selected for the Institute were representative of teachers operating vocational education programs in the region. The question seems to be whether they were teaching in the areas planned for the Institute. Evidently there wasn't adequate lead time for proper communication between the Institute staff and the leaders in the states from which the trainees were selected. Thus, some trainees were selected for the Institute without having been adequately informed as to the background they should have to fully benefit from the instruction and the objectives of the courses they would be taking. It was apparent that several trainees were selected for courses which were not related to their teaching field. Members of the teaching staff reported that they were not aware of the backgrounds of the trainees initially and they had no time for pre planning.

It is essential that the needs of trainees be carefully assessed and courses be developed and taught in terms of their needs. It is recommended that more attention be given to the selection of trainees according to the criteria spelled out in the proposal. They are sound. Adequate time for advanced planning is also a must for an institute of this kind.

Question No. 3. Were the courses in Vocational and Technical Education, presented by the University of Tennessee, adequate for the needs of the training group?

Several questions have been raised regarding the adequacy of the courses presented by the University of Tennessee. They need to be carefully analyzed because they relate to a significant aspect of the experiment.

The proposal indicated that courses would be preceded by a two-week period for trainee guidance, counseling, testing, and remedial work, if needed, to determine, on an individual basis, the program to be pursued by each trainee. The question was raised as to whether this was actually done. One of the spokesmen from the University of Tennessee said that their course outlines were the traditional ones and they were taught according to traditional methods. If that is so then I have the feeling that some changes are in order. I recognize that they did not start working with the institute until July 1, which was after the orientation period. However, a significant objective of the Institute was research and experimentation of teaching methods directed toward improving the total training process. The intention was to search for new innovations and improvements as the program progressed and then test them out.

These courses should take on a uniqueness afforded by the situation if they can be justified. They need to relate closely to the technical courses offered and strong effort should be made to take advantage of the facilities provided by the industrial setting. Perhaps the technical people should be involved to some extent in the teaching of these courses (and likewise the University of Tennessee teachers should be involved to some extent in teaching the technical courses.) They represent resources and opportunities which are unique to this situation.

If the situation does not provide opportunity for new innovations and improvements in teaching the professional courses then I believe the students have a strong argument. They can take such courses back in their home states and should not duplicate them here. By taking these courses in their home state the content can be related to the characteristics of the home state program.

This poses an important question that should be carefully analyzed, "Which is more significant - attempting to coordinate the entire teacher training program through University - industry cooperation in an industrial setting, or relate professional courses, which include curriculum development, to the home state program? If the latter is true then perhaps the professional courses in the Institute could be questioned? I feel sure that students should not be expected to repeat these courses. Persons who have not had the courses and need the credits for certification purposes present another problem. Also, it is questionable whether the facilities used for teaching the professional courses (classrooms, laboratories and library) are comparable to those provided by the Universities. It was pointed out that there was no laboratory available for the preparation of audio-visual aids and the library facilities were inadequate.

Question No. 4. Was the technical material presented in lectures and laboratory by Union Carbide Corporation adequate for the needs of the group?

Presumably, the trainees were satisfied with the content of the technical courses and the amount of technical material presented. However, the questions that were raised seem to be significant. They had to do with the transfer of knowledge to the teaching situation back home and the method of teaching.

The acquiring of knowledge and its appropriateness for the teaching-learning situation are two different things. The teacher should know his students and their needs, interests, and capabilities. Teaching at the high school level, teaching at the post-high school level, and teaching adults require different applications of knowledge and skills. It is possible for teachers to acquire certain kinds of information that they are glad to get, but find very little use for it in the jobs they are expected to do.

I am of the opinion that knowledge and skills need to relate very closely to the specific teaching objectives of the trainees in their training situation. Theory must be tied as close as possible to practice. The trainees need to see the possibilities of using this knowledge and skill in their teaching situations back home. This is not minimizing the value of the subject matter in helping trainees up-date their understanding of technology and its contribution to a broad basic education. Adequate time should be included in the instructional program to identify opportunities in the teaching situation back home for making application of the knowledge and skills acquired in the Institute.

The other question had to do with the amount of time devoted to lecture, laboratory and actual practice. It is hard to evaluate such a question when one does not know the background of the students and has not observed the teaching methods. There needs to be a good balance between theory and practice. The teacher needs to be well grounded in both. They are closely related and need to be learned together.

Some exposure to new equipment and new machines has a broadening and wholesome effect on the teacher. However, I have the feeling that a major portion of the instruction should relate to what the trainee will be expected to do in his own teaching assignment and what he will have the opportunity to put into practice.

I understand that a course was taught on the use of visual aids. I don't recall any explanation of the extent to which visual aids were stressed in the Institute, except that 75 percent of the teachers used visuals. This is the first place where their use should be stressed, practiced and evaluated.

The questions raised regarding the seminar session just after the noon meal deserve careful study. I am inclined to believe that there should be some flexibility in scheduling such seminars. At times it may be appropriate to assemble the entire group. At other times it may be more desirable to divide the trainees according to the course areas in which they are enrolled.

Question No. 7. What comments may be offered on the guidance and counseling program?

I understand that two weeks were scheduled for student orientation, testing and counseling prior to the beginning of the instructional phase. However, only one week was actually used. Presumably, this was considered to be too long by the students. They would have preferred to start the instruction much earlier.

I am of the opinion that the most effective guidance and counseling program is one that recognizes the classroom teacher as an important counselor in many situations and there needs to be close working relationships between the counselor and the teacher.

I am not in a position to appraise the actual tests that were used by the counselors. It was pointed out that the testing program got off to a bad start and some of the tests did not discriminate. Evidently, the trainees were not properly conditioned for it - the what, why and how. It seems to be an important aspect of the project and should be planned to yield the kinds of answers needed in counseling and guidance. This kind of information should be readily available to the teachers. Also, it is highly desirable that an accumulative personnel folder be maintained on each trainee. I am wondering whether it wouldn't be highly desirable to secure some background information on the trainees before they report to the Institute.

I am aware of the comment made by one of the counselors that this was a good situation for training counselors. I am sure this was not a major objective of the Institute. However, I would assume that the other teachers could say the same thing. It would seem to be highly desirable to retain as much of the staff employed for this Institute as possible to conduct the next Institute because of the valuable experience and new insights acquired during this one.

Question No. 8. What comments may be offered on the coordination of the program?

I am sure that coordination of this program was a major task. It seems to have been done in an effective manner. I was impressed with the coordination that went into the review sessions.

I feel sure that the delay in funding the project adversely affected some of the coordination efforts. There seemed to be need for closer coordination between the teachers of the professional courses and those teaching the technical courses. The instruction should be closely related and to some extent integrated. Perhaps the late arrival of the University of Tennessee staff affected this coordination somewhat.

Also, coordination with the contact people in the cooperating states should be more firmly established. This is the case in recruiting, selecting trainees and securing essential background information on the trainees, and in making arrangement for the college credits to be accepted by the institutions where the trainees are working for their next degree.

Question No. 9. What application does the Institute hold for similar Institutes elsewhere?

I was impressed with the cooperative arrangement between the University of Tennessee and Oak Ridge Associated Universities. I believe the concept is sound. Also, I believe there must be a close working relationship established between teacher training institutions and industry in the preparation of qualified teachers for vocational education programs. It is essential in maintaining teachers with a high level of competence and in providing up-to-date facilities.

I am sure that the program approved at Oak Ridge will yield answers which will indicate the feasibility of such an arrangement for the in-service training of vocational and technical teachers. If it proves to be a desirable arrangement then I am sure there are many other places in the region where similar programs could and should be established.

Question No. 10. What developments of this Institute warrant publication?

At this point in time I have no firm recommendations regarding what should be published. This is a pilot project and as such the basic objectives should be thoroughly tested before you are ready to open the door and demonstrate the program.

You need to relate to the states what the program expects to accomplish in order to recruit for the next Institute. If courses taught by the people from Union Carbide are available for distribution, they may be good material to use in the recruitment program. In time I have the feeling that you will want to tell the region and other parts of the country about the entire program and what has been accomplished. I believe you have built into the project the internal and external evaluative procedures needed to determine the real merits of the program.

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

William G. Loomis, State Director
Vocational Education
State of Oregon

The observations contained in this Program Review are based upon:

1. The conference called by the Oak Ridge Associated Universities, September 9-10, 1966, to recreate to the extent possible what transpired during the Summer Institute.

2. Evaluation reports and other written material prepared by the Institute staff that would be of value to the Review Panel in the judgment of the Project personnel.

3. A brief and casual visit to the shop and laboratory facilities of the Oak Ridge Y-12 Plant, operated by Union Carbide Corporation-Nuclear Division, which was used for the technology training phase of the Institute.

The Institute officials outlined ten questions which they suggested the Review Panel consider in preparing their individual reports. It was further suggested that we use the following criteria as models of measurements as much as possible when submitting our findings: (1) that we keep in mind the objectives of this project as initially concerned; (2) that we consider the ingredients essential to an ideal program; and (3) that we have in mind the typical (normal or realistic) program now prevalent throughout the country for the training of vocational industrial-technical teachers.

Finally, we were advised that we were not expected to pass judgment, in any total sense, upon the Summer Institute. Rather, it was hoped that this "outside" review would be made from the point of view of offering suggestions for improvement for the 1967 Institute or for programs that may develop elsewhere.

1. What are your impressions of the concept of training vocational and technical teachers in an industrial setting?

   We, in vocational education, have, of course, always subscribed to this method of training teachers. However, this particular approach to an "industry setting" is somewhat unique. Unless the enrollees in such a program are well screened, the technology background may vary to such an extent that an individualized program will need to be planned for the majority. This would doubtless be unrealistic to administer. A more desirable approach would of course be to outline the technological content planned for each Institute and recruit enrollees who can derive optimum benefit from such instruction.

2. Was the group of teachers which attended the Institute representative of the teachers in the vocational areas?

   As most of us indicated at the time of the Review Panel Conference, we did not have sufficient information available on each of the 60 enrollees of the 1966 Institute to react objectively to this question. However, I would make the following observations:

   We were advised by the Institute staff that the Project was funded so late that little time was available to recruit and screen enrollees.

If the contents of the technology courses are clearly delineated and it is made clear to school officials and prospective enrollees that only those with the appropriate experiences and background should apply, this type of project will be more effective and have long-time implications.

It should be well understood by all concerned that Institutes, such as the 1966 summer session, are designed for vocational-technical teachers in selected occupational areas. It should also be stressed that these Institutes are structured to upgrade and update teachers who already have certain occupational competencies in these selected occupational fields.

Unless the objectives of this project are radically changed, it should be made clear that such Institutes are not intended for industrial arts teachers and teachers desiring to acquire "pre-job experiences." A distinction should doubtless also be made between programs designed for technical and skilled trade teachers.

3. Were the courses in vocational and technical education, presented by the University of Tennessee, adequate for the needs of the training group?

It would be presumptuous on my part to attempt to assess the "adequacy" of these professional educational courses without much more information on the background of the individual enrollees--and I am assuming that the courses offered were soundly conceived and presented.

It would be my suggestion, however, that certain professional education courses, or their equivalent, be a prerequisite to enrollment in the Institutes in the future. If the prospective enrollee does not have the basic professional education courses, he would be well advised to secure such courses in his own area (state). If he has such courses, it is beyond my comprehension why he should be required to take such a course again. It compromises the enrollee, the instructor of the course, and the institution granting credit--as well as being ridiculous, and unrealistic!

It would be my suggestion that any professional education courses offered be of the type that would permit the enrollee to capitalize upon his environment at the Summer Institute as well as certain prerequisites he should already have acquired in educational procedures and practices. If this approach to offering professional education courses is followed, the courses could be designed more appropriately to meet the individual needs of the enrollees and still limit such offerings. These offerings might be in the area of advanced course or curriculum development, research procedures and application with group and individual implications, and testing and evaluation with provisions for group and individual activities.

If these Institutes are planned in such a manner that an enrollee may return from time to time--and this would seem desirable--it would not seem practical to require him to register for professional education courses at each Institute unless they meet his needs. Alternates might include using a certificate of attendance, which is a record of in-service training he may use, or provide for college credit for certain of the technology courses.

4. Was the technical material presented in lectures and laboratory by Union Carbide Corporation adequate for the needs of the group?

   From the information available it would appear that too much emphasis was placed upon providing technical information that could not be used by the teachers in their own school setting. It would seem desirable to provide more time for the application of certain technical information and industrial practices in the shops and laboratories in order that the enrollees could gain sufficient skill to make application of such skills in their schools. Apparently, plans are underway to provide for more of this type of experience next year.

5. Was there a proper relationship and balance between the technical and education material?

   My comments under Item #3 are pertinent here. In sum, I would say that it would seem most desirable to give a major portion of the time to the technology courses. The availability of such industrial facilities should be capitalized upon when they are made available in this manner.

6. What comments might be offered on methods of presenting the material?

   It was quite evident that Union Carbide officials made a very conscientious effort to provide adequate facilities and top flight personnel for presentations. As noted under Item #4, however, it appears that emphasis was placed upon presenting an excessive amount of theory training, and such presentations provided little opportunity for application on the part of the enrollees. It would seem that the instruction was more appropriately designed for enrollees who already possessed a high degree of technical knowledge, and skill in the use of such knowledge.

   Greater attention could well be given to the knowledge we have of how people learn. This will doubtless change some of the "methods" used in presenting material.

7. What comments may be offered on the guidance and counseling program?

   A certain amount of counseling and guidance is certainly needed. However, it would seem to me that, if the content of the courses is well delineated in advance, and the prospective enrollees are screened "against" such course offerings in their own states and schools, much of the testing, counseling and guidance carried on the first week of the Institute--and in subsequent weeks--could be eliminated. I would also question the value of using graduate students from the neighboring university as counselors. If appropriate screening is done before enrolling it would seem to me that the guidance and counseling needed at the Institute would require a person most knowledgeable and experienced in principles and practices of vocational education.

8. What comments may be offered on the coordination of the program?

It appeared to me that a most commendable job of coordinating this project has been taking place. It was most unfortunate that the late funding prevented more pre-planning and program development. Assuming the problem will not prevail next year, I further assume that much more effort can be spent in program development, student recruitment and screening prior to Institute time. This is a must if program success is to be assured.

9. What applications does the Institute hold for similar Institutes elsewhere?

I would hope that the experiences gained in this project can be adapted to other business and industrial fields in other parts of the country. The successful demonstration of cooperative efforts of industry, government, higher education and the public schools on such a project should provide landmarks for future use.

Every effort should be made to provide feedback to the state and local communities--including local industry. The long-range support for continuing such projects will depend upon it.

The cost benefit aspects of this approach to in-service training must be demonstrated.

10. What developments of this Institute warrant publication?

In my opinion more information is needed on the benefits of this project. The follow-up of students from this first Institute plus the operation of the 1967 Institute should provide objective data that can be appropriately publicized. Until the 1967 Institute has operated--under more favorable conditions--it would seem to me that publicity on accomplishments should be at a minimum.

Summary Observation

Without question, the seeking of new ways and means of providing in-service training for vocational-technical teachers is most desirable and essential. This project calls for the cooperative effort of industry, public education, higher education and other pertinent organizations. It is a most commendable project and should be pursued to the point where the feasible aspects of the program are well identified and available for use elsewhere.

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

Byrl R. Shoemaker
Director of Vocational Education
State of Ohio
Columbus

C 40 / C-41

The stated goal of the project was to update the preparation of vocational and technical teachers, as a part of a major goal to arrive at a model for this type of activity. Both goals are worthy and in keeping with the great need that we have throughout the Nation to upgrade existing teachers, many of whom have been out of industry for ten to fifteen years.

Achievement in Relationship to Goals

A. Teacher Selection

One major problem affecting the program was that of teacher selection. A review of the teacher enrollment in the drafting section indicated that most of the teachers did not have the background to participate in the type of upgrading program provided them during the seminar. The size of the problem is reflected in the report in which over half of the teachers indicated they could not implement the knowledge gained through the curricula taught in the local school, and another large segment of the group did not indicate that they would be able to implement any major segment of the new concepts or ideas.

Suggestion --

The areas of upgrading must be clearly identified in terms of vocational or technical education programs served and teachers enrolled only on the basis of their background and work experiences and present teaching assignments. It is suggested that vocational teachers and post-high school technical teachers be in separate groups.

B. Program Content

University of Tennessee

The amount of dissatisfaction expressed by the teachers with regard to the instructional program provided at the University of Tennessee can be traced largely to the fact that many of the teachers had already participated in the instructional areas provided by the University of Tennessee and on this basis, felt they were duplicating efforts and wasting time.

It is to the credit of the University of Tennessee that they made a major effort to adapt the instructional program to the individual needs of the students, and that teacher dissatisfaction decreased as the program progressed.

Throughout the comments of the teachers, there is indicated a need for assistance in determining the application of the knowledge provided in the seminar to their local programs, which assistance might also include the development of instructional outlines and instructional materials.

Suggestion --

Since each State has some varying requirements as to teacher preparation with regard to certification, and since many teachers in the need of upgrading will have completed the minimum requirements under teacher education, it is suggested that the plan to provide basic teacher education in required courses be dropped and instructional programs established to assist the teachers in integrating the new ideas and techniques into their local programs, which instruction includes the development of curriculum outlines and instructional materials.

Union Carbide

In the development of the program for upgrading of teachers, there seems to be confusion with regard to instruction which would increase "knowledge about" and instruction providing "ability to use." New developments may be motivational in nature but provide little direct application to the classroom or laboratory instruction of the teachers, except in the enrichment of their illustrations and use as "motivational information." Instruction directed toward "ability to use" points toward upgrading the instructional content of the classroom or laboratory and provides a direct application to the local programs in which the teacher is employed. I agree that both areas can be included in an upgrading program for teachers, but believe that instruction must be organized with regard to its relationship to these two different goals.

It was obvious from the teachers' comments that they wanted more practical application and opportunity to participate in doing experiences. Participation in actual laboratory practices is important for those items in which they must develop "the ability to use," but not important in terms of the items concerned with "knowledge about."

Suggestion --

The instructional program provided by the industry should delineate the areas in which "knowledge about" advanced techniques or processes are provided basically for motivation and understanding, and the instructional areas directed toward the "ability to use," in which actual "hands on" experiences must be provided in order to enable the teacher to implement the instruction into the local classroom and laboratory.

In terms of upgrading teachers, the greater emphasis in the program should be put upon those items which they can apply directly to their classroom or laboratory.

It is suggested that the content be different for vocational and technical teachers.

C. Instructional Methods

University of Tennessee

The negative attitude of the students toward the instructional program provided by the University of Tennessee at the outset of the program was undoubtedly affected by the lack of preparation time available to teachers and the dissatisfaction with the instructional areas provided.

A review of reports toward the end of the session would indicate that the instructional methods and techniques of the University of Tennessee teacher educators were satisfactory. It was obvious that the instructional program conducted by the University of Tennessee was handicapped by the lack of adequate instructional equipment and facilities.

Suggestion --

The suggestion was made in Section B which pointed toward a major change in the areas of the instructional program provided. I would suggest that adequate facilities be found for whatever instructional program is provided, even if such instructional facilities must be in a local high school or university center.

Union Carbide

From the reports made concerning the project, it is obvious that the program would have been assisted by an understanding of the differences between "telling" and "teaching." The predominant use of the lecture method over extended periods of time indicated a lack of understanding of the learning process. Lectures and the presentation of papers as the backbone of communications at the scientific level are directed to people extremely knowledgeable in their field, who are looking for selected facts applicable to their field. In the case of the upgrading program for teachers, we are not only attempting to motivate and inform them, but, also attempting to enable them to use the information by imparting it to others.

Suggestion --

Instructional programs provided by the Union Carbide should follow good instructional technique and serve as a demonstration of good instructional techniques for the teachers participating.

D. Evaluation of Model

Desirability

There is no question about the necessity for the development of upgrading programs for existing teachers in vocational education. Also, there is no question about the importance of the participation of industries and businesses in such upgrading program. While university campuses can be used for instructional programs upgrading the technical knowledge of teachers, experiences in the practical applications of this technical knowledge and upgrading of skills often will require participation with private industrial or business units.

The model, in terms of a cooperative effort between a university and industry, indicates a very desirable cooperative relationship.

Changes that can be made with adequate time for preparation prior to the establishment of the program for next summer, can bring the program under the Oak Ridge Associated Universities to the point where it will make an important contribution to the upgrading of skills and knowledges of employed teachers.

Feasibility

While there is no question about the ability of the cooperative relationship of the University of Tennessee and the Union Carbide Company, under the coordinative efforts of the Oak Ridge Associated Universities, to do an excellent job of upgrading employed teachers, I believe there is a real question with regard to the cost of such a program and the availability of plant facilities.

With the size of the job to be done throughout the Nation, I question whether programs involving the costs included in the Oak Ridge experimental model can be justified. It is my thought that the major contribution of the model will be in pointing the way toward university-industry cooperation with industries providing instructional facilities and services without cost to the local communities or sections of the State. There will be a problem in many places in the availability of plant facilities for such upgrading programs unless the participating company has a training facility such as the General Motors Training Institute or the Cincinnati Milling Machine Training Center. We have found that industries in production on a competititve basis cannot withdraw such facilities from production. Reports from the Oak Ridge Project indicate that in some cases production had to take precedence over instruction.

EVALUATION PANEL REPORT

Summer 1966 Vocational-Technical Teacher Institute

Submitted by:

Merle E. Strong
Assistant Director
Program Services
Department of Health, Education
and Welfare
Washington, D. C.

General Comments

The staff for the Project is to be highly commended on the organization and conduct of the "Evaluation and Advisory Conference" held in Oak Ridge, September 9-10, 1966. Information on the program was reported in a concise manner with strengths and weaknesses reported as identified.

It is recognized that the Summer In-Service Institute operated with some handicaps due to delay in funding, thus causing a delay in lead time for staffing and planning. However, the comments and reactions which will follow will tend to compare the program with the ideal as it is a strongly held position that a program funded in this manner should be exemplary in every detail.

Reactions which follow are in response to the ten questions posed to the evaluation group.

1. What are your impressions of the concept of training vocational and technical teachers in an industrial setting?

   The concept is sound and in general, is not new to vocational and technical education because in reality industry has always been relied on to provide persons as potential teachers with technical knowledge and skills.

   Teachers have traditionally been recruited from industry and have been encouraged to return for summer work to help in updating knowledge and skills. Unfortunately, this has not happened on a systematic basis in enough schools. Also training facilities of industries such as General Motors Training Centers have been used for summer training programs. The Oak Ridge project is unique in its organization and represents the first education-industry cooperative project with substantial funding from public education.

2. Was the group of teachers which attended the Institute representative of the teachers in the vocational areas?

   The selection of teachers included in the Summer Institute is strongly questioned. The priorities set forth in the proposal (February 21, 1966 revision) seem appropriate and realistic, however, it appears that a number of teachers did not meet the suggested qualifications. Also, it was apparent that teachers were selected who were not teaching in one of the three fields for which training was being provided. In future classes strict adherence should be placed on selection in order to fulfill the purposes of the project.

3. Were the courses in vocational and technical education, presented by the University of Tennessee, adequate for the needs of the training group?

   I would raise a question regarding the appropriateness of providing standard vocational and technical education courses as a part of the training project at Oak Ridge. This question was raised prior to the funding of the project and it would appear that the experience in the project makes this an even more valid question. The evaluation has indicated that a number of instructors had already had the courses that were offered. An even more important point in my opinion is the fact that the project, as a result of the facilities of the Atomic Energy Commission and the Union Carbide Corporation technical personnel, is in a unique position to provide skill and technical up-grading. Participants' time should be directed toward making maximum use of these competencies rather than spending such a large percentage of their time in professional courses which should be readily available through some other means. It is my recommendation that standard professional vocational courses not be provided as a part of this training package. It would seem highly desirable and appropriate, however, to have one class period per day devoted to the application of the technical skill content to the training program to be carried on back at the local school.

The facilities for conducting the professional portion of the project appeared to be less than optimum. The classrooms were poor (one was too small, neither were air conditioned). It appeared that the audio-visual class was taught in a conventional classroom situation.

4. Was the technical material presented in lectures and laboratory by Union Carbide Corporation adequate for the needs to the group?

   The Union Carbide Corporation should be complimented on the willingness to involve many high level people in providing lectures and other instruction to the group. It is my opinion that the broad exposure of subject matter areas will be helpful to each instructor in understanding new industrial technology. However, in my opinion the training program failed to provide depth instruction, making possible the development of skills and knowledge in the specific areas in which the instructors will be teaching. Strong consideration must be given to providing trainees with the opportunity to actually operate equipment and develop skills and knowledges directly applicable to their teaching. There is probably some truth in the old adage that lecturing is not teaching. The lecture method was undoubtedly over used.

5. Was there a proper relationship and balance between the technical and education materials?

   The industrial facilities and technological competencies of the Atomic Energy Commission and the Union Carbide Corporation should be exploited to their fullest rather than spend so much time in professional courses since many of the students may have already had the courses or will have them available through some other means. It would seem appropriate that some of the time allotted to professional courses be given over to more depth instruction in the development of technical skills and knowledge.

6. What comments might be offered on methods of presenting the material?

It would appear that too much time was spent on lectures without the opportunity for students to make application of what was presented. Much of the material would seem to be at the information or "nice to know level" rather than at the use level. Additional shop and laboratory time should be made available. It would also appear that too much time may have been spent on new or unique equipment or processes to the exclusion of instruction on more common process equipment. It would appear that there should be some balance between the two which could best be determined after a critical analysis of each instructor's needs.

In machine shop, for example, it was indicated that laboratory time was spent on four machines only, none of which would be common to school shop training situations or perhaps to an industry in which youth would receive employment. One of the four machines, I believe, was the deep hole drill which is a highly specialized kind of machine, in fact, so specialized that it may be the only one in Tennessee or for that matter in the South.

7. What comments may be offered on the guidance and counseling program?

   It would appear to be inappropriate to involve the trainees for a full week at the beginning of the training session in testing and counseling activities. It would seem that insofar as possible activities should be spread over two or more weeks so that trainees would immediately be involved in a part of the instruction program, preferably in actual shop or laboratory work. It would also seem that one of the functions performed by the counselors, that of attempting to recommend instructional content based on student background, would more properly be carried out by the instructional staff who have knowledge of the skills and competencies needed in the occupation. It was inferred several times during the evaluation discussions that the process served as a good training media for the counselors. I would agree with this, however, would question that this should be used as justification for involving counselors in this manner. With proper student selection and more realistic programming the need for this type of counseling would certainly be minimized.

8. What comments may be offered on the coordination of the program?

   Coordination of the program was certainly a tremendous task with the number of agencies involved and the short period of time available for the detailed development of the program. It would appear that under the circumstances the coordination of the program was effective. It does appear, however, that there was a lack of correlation between instruction in the professional aspects of vocational education and the technical training.

9. What applications does the Institute hold for similar Institutes elsewhere?

   This Institute certainly has general application to the possibility of Institutes being established in other industries provided that further evaluation shows feasibility in terms of cost and efficiency compared with other methods of training. Perhaps it will take a second session in which planning, student selection, and instruction can represent the optimum in a quality program before a model can be developed that should be aggressively promoted to be conducted in other Institutes and industries.

10. What developments of this Institute warrant publication:

I would not suggest giving wide publicity on the details of the first program. Publicity on the cooperative arrangement and the general provision of the Institute would be appropriate. An opportunity was not afforded to review the technical materials presented or made available to the participants. It is possible that summaries of some of these materials might be made available to vocational education personnel.

The above comments are meant to be constructively critical. While the program had much to commend it, in the opinion of the writer, combined best efforts of the organizations and personnel involved can result in a much more effective program in the next session which then should be documented and highly publicized.

EVALUATION AND ADVISORY CONFERENCE

Summer 1967, In-Service Vocational-
Technical Teacher Training Institute

August 7-8, 1967

EVALUATION AND ADVISORY CONFERENCE ATTENDANCE
Summer 1967, In-Service Vocational-Technical
Teacher Training Institute
August 7-8, 1967

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Robert Hudson
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EVALUATION AND ADVISORY CONFERENCE
SUMMER 1967
IN-SERVICE VOCATIONAL-TECHNICAL TEACHER INSTITUTE

August 7-8, 1967

Monday		
August 7 a.m.	Oak Ridge Associated Universities Conference Room	
p.m.	Y-12 Plant, Training and Technology Facilities	

AGENDA

9:00 a.m.	Welcome	Pollard
	Purposes of Conference and Outline of Questions Which Need to be Answered	Russell
	Industrial Involvement in Vocational Education	Waters
	Institute Activities and Education Program	Maurer
	Recruitment and Selection	Maurer
	Course Content	Powell
	University of Tennessee	
	Seminars	Powell
	Guidance	LaBorde
10:30 a.m.	BREAK	
	Union Carbide Corp.-Nuclear Division	
	Electronics Technology	Booth
	Physical Testing - Welding	Lanter
	Tool and Machine Design	Myers
	Machine Shop and Fabrication	Dew
	Participant Responses	
	Course Content Survey Summary, 6 week	Hamel
	Entry Survey Highlights	Hamel
	Seminar Feedback Summary	Maurer
12:00 noon	LUNCH	
	Holiday Inn, Ridge Room	

August 7, continued

1:30 p.m.	Visit to Project	Pearson
	Building 9709, Room 8	
	Tour of Facilities	
	Observation of Classes in Session	
2:45 p.m.	COFFEE BREAK	
	Informal Visits with Participants During Coffee Break	
3:15 p.m.	Questions and Discussion with Institute Participant Representatives	
	Building 9709, Room 8	
	Electronics Technology	Miller Shehane
	Physical Testing - Welding	Pedro Quarles
	Tool and Machine Design	Howard Sowders
	Machine Shop and Fabrication	Slater Cipriano
5:00 p.m.	Return to ORAU Administration Conference Room	
5:15 p.m.	RECEPTION	
6:30 p.m.	DINNER	
	Holiday Inn, Ridge Room	
	Opportunity to Discuss the Project Informally with Members of the Project Staff	
	Group Discussion	Waters Maurer
8:30 p.m.	ADJOURN	

August 8 Oak Ridge Associated Universities Conference Room

9:00 a.m. Review of Questions Which Need to be Answered . . . Russell

Follow-up Discussion . . . . Hamel

Project Supervisors and Administrators will Answer Questions Which Need Clarification

Wendell H. Russell - TAT Project Director, ORAU
J. Leo Waters - Program Manager, UCC-ND
Dr. Donald E. Maurer - Educational Director, UT
John C. Hamel - Training and Experimentation Coordinator, ORAU
B. Ralph Pearson - Training Director Y-12, UCC-ND
Gerald LaBorde - Guidance Coordinator, UT
F. C. Lowry - Assistant to Program Manager, UCC-ND
Terrence L. Powell - Teacher Trainer, UT
Frank Booth - Training Supervisor, Electronics, UCC-ND
Richard Dew - Training Supervisor, Machining, UCC-ND
Bill Myers - Training Supervisor, Drafting, UCC-ND
Bill Lanter - Training Supervisor, Physical Test-Welding, UCC-ND

10:30 a.m. BREAK

Evaluation Report Form . . . . Hamel

11:30 a.m. ADJOURN

1967 SUMMER IN-SERVICE TEACHER INSTITUTE
EVALUATION AND ADVISORY CONFERENCE

Suggested Questions for Consideration

This conference is designed to provide information for an independent evaluation of the Training and Technology Project's 1967 Summer In-Service Teacher Institute by teachers concerned with vocational education. The Institute's setting, objectives and activities will be described in detail. Panel members are invited to question speakers, staff and teacher participants at any time to clarify specific points on which more information is desired. Periods for questions and discussion have been provided in the schedule for further examination of project activities. Informal break periods have been included for additional communication with Institute participants and staff members.

From the information presented it is hoped that the conference members will submit independent analyses and evaluations in writing to ORAU. A format has been developed containing the following questions to help organize the responses for summary purposes. You are encouraged, however, to comment on any aspect whether or not it is categorized in the format.

The suggested questions for consideration are:

General

1. Need--What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

2. Concept--What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

3. Application--What applications of this concept or several concepts would you recommend for other locations in the country?

TAT Operation

1. Teacher Selection--Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

2. Course Content--What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute?

3. Personnel--What are the strengths and weaknesses of the personnel used to conduct the Institute?

4. Facilities--What are the strengths and weaknesses of the training facilities used during the Institute?

5. Equipment--What are your impressions of the shop and laboratory equipment made available to the Institute?

6. Curriculum and Methods--What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

7. Coordination--What are your impressions of the coordination between the technical and education courses in the Institute?

Publication

Are any aspects of the Institute particularly worthy of publication?

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

Submitted by:

S. Walter Hixon, Jr.
Supervisory Employee Development Specialist
NASA-Langley Research Center
Langley Station, Mail Stop 309
Hampton, Virginia

General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

   A vocational and technical teacher should have a degree with courses in education, and the teacher should be skilled in the particular area in which he is going to instruct. For a number of years, degree teachers who are qualified to instruct in the fields of drafting, machine shop, sheet metal, etc. have not been available at the salaries proposed by the local school boards. Teachers with lesser qualifications have been employed - some with no college education, and some approaching degree status. The problem of raising all of these teachers to a degree level is a large and serious one. The question of transfer credits from one college to another and the question of credits for work experience have not been solved on a fair and equitable basis. I have no doubt that the vocational and technical teacher has a desire to upgrade his educational level, and most of them would continue to work and study if it was certain that a degree could be obtained.

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

   One of the best methods of upgrading vocational and technical teachers is in an industrial setting. Industry has excellent facilities available, competent personnel who could be made available as instructors, and might derive company benefits by giving the training. Teachers have ideas that industry can use, and reasonable profits for industry may be expected when programs are developed, planned, and conducted. It is suggested that efforts be made, possibly through teacher organizations or college groups, to develop a program through a college or university in this area that would take a particular interest in helping the vocational teachers by offering summer and evening school courses, correspondence courses, and other credit programs connected with industry. If these teachers understand that they will receive special consideration from some institution that will plan a complete and reasonable program for them, it is believed that the overall education of this group will be greatly improved.

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

   I believe that an Inservice Teacher Institute, such as the one at Oak Ridge this summer would be beneficial for each state. If possible, arrangements should be made for these Institutes to carry college credit. In Virginia, a program could be developed in connection with Virginia industries such as the Lynchburg Machine and Foundry Company, the Cardwell Machine Company of Richmond, or the Newport News Shipbuilding and Drydock Company.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

   The teachers for this program were well selected and I believe that they all benefited from the program. I have a personal feeling, however, that the maximum age limit should be no higher than 60.

2. Course Content - What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute? What are your impressions of the Union Carbide Nuclear Division's technical courses offered in the Institute?

   The University of Tennessee's educational group should be commended for its excellent work in devising the courses offered at the Institute. I am sure that many hours of hard work and study were spent in arranging this program. I have a feeling that the lecture work was well integrated with the laboratory work. The Union Carbide Nuclear Division should also be commended for its efforts in developing its courses. In all courses offered there is always a debate concerning the length of theory versus laboratory work. My feeling is that this division was very equitably divided.

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

   The personnel used to conduct the Institute were highly competent and capable people. If such an Institute were to be conducted in the State of Virginia, we would like to feel that those conducting the Institute would be equally competent.

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

   The facilities used during the Institute were not plush - but adequate.

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

   The equipment was, in some instances, not as highly sophisticated as might be expected, but served the purpose. There were some complaints regarding the lack of some electronic equipment and the lack of automated numerical power machinery. Some of the instructors thought they should have had quite a bit more work on this type of equipment. However, to purchase this type of equipment for school purposes is pretty much out of the question, and the failure to get machine time on this type of equipment may not have been a handicap.

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

   The greatest strength of the curriculum and teaching methods is the coordination between theory and practice. From all indications, this was well done by the University of Tennessee and Union Carbide.

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

After talking to quite a number of participants and teachers in the Institute, I was highly impressed with the coordination between technical and education courses at the Institute.

Publication

Are any aspects of the Institute particularly worthy of publication?

I feel that the Inservice Teacher Institute program should be written up and published in an education magazine. Such published material would be very helpful to other states in upgrading their technical and vocational teaching staff.

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

Submitted by:

R. H. Hudson
Training Director
Lockheed-Georgia Company
Marietta, Georgia

In evaluating the Institute one must first recognize the personal motivation and creativity of the staff in getting such a project as this off the ground, and in the process recognize the positive efforts, both direct and indirect, that come from such a program. This evaluation in no way should diminish these positive accomplishments but instead point out ways in which we can learn from today's experience to make a better contribution tomorrow. The Oak Ridge Associated Universities, the University of Tennessee, and the Union Carbide Corporation must be commended for this creative effort. I consider the participants fortunate in having been exposed to such a staff which demonstrated so much sincerity and enthusiasm in making this program a meaningful experience for the teachers.

General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

   The most serious problem is the absence of standards or universally accepted base lines for use in evaluating vocational or occupational programs. This is attested to by the apparent disinterest in the Institute displayed by the state vocational program administrators.

   Occupation education programs in the final analysis can only be evaluated in terms of employability of the graduate. Too many vocational programs are evaluated on the basis of an educational process rather than that of its product. Until program administrators are more acceptable to evaluating their performance in terms of their pdoduct, it is difficult to see how program standards or teacher criteria can develop. Then and only then can school administrators identify the shortcomings in their programs and teachers and be concerned about plugging the gaps.

   It is my impression that more and more state administrators are recognizing this problem and are taking steps to better define solutions. The current attempt by the Southern Association of Colleges and Schools to develop an affiliation to work toward the setting of standards with ultimate accreditation seems to be an excellent alternative to deal with this problem.

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

   The merit of providing teacher training in an industrial environment is obvious if the goals are to equip the teacher to teach what industry needs in terms of developed capabilities and attitudinal requirements, along with manual skills and decision making requirements of a particular job.

   Industry would certainly gain by having more qualified labor available, along with the added gain of cost reductions that result from minimizing the time required for a student to integrate into his industrial job.

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

While we must recognize that we have a rather mobile society, vocational program directors can identify those businesses and industries that characteristically hire their product. This would enable them to establish liaison with those companies to provide seminars and summer jobs. Most realistic would be an ongoing teacher development program at each school which would require visitation to those industries in their geographical areas. To make this effective, school administrators must first see this as an integral part of a teacher's job and provide time away from class on a continuing basis to effect this type of coordination.

Teachers must be taught what questions to ask while in an industrial environment. Industrial people can easily identify the task to be performed, but seldom have they taken the time to identify the learning increments of doing the job.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

From the information available it was my conclusion that the acceptance of the teachers in the program was due more to the happenstance of their applying than to a selection process.

While I am sure that each teacher in the program benefited from his participation, it appears that the Institute was prevented from exercising any real selection criteria due to a lack of response. The lack of response from state departments of vocational education to me is evidence of a lack of standards or concerns on the part of state administrators for instructor credentials.

2. Course Content - What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute? What are your impressions of the Union Carbide Nuclear Division's technical courses offered in the Institute?

As I had no opportunity to observe the University of Tennessee education courses in action, I cannot assess their strengths or weaknesses. Feedback from the participants was varied; for the most part comments were good. Each was enthusiastic regarding the development of material for back home use. I would feel safe in predicting that in too many instances much of this material will be the "tail wagging the dog."

I was impressed with the dedication and objectivity of the Union Carbide staff. If their objective was to present the widest possible overview of the state-of-the-art in each of the four areas, they were obviously successful. With my short exposure I saw very little evidence of any real attempt to make this material useful to the participants. The comments of the teachers led me to believe that the real effect of the high volume of material offered was oriented more toward identifying what they did not know rather than equipping them with specifics that would have as its end product student employability.

The two lectures I witnessed were indicative of excessive lecture with little or no application. One of the lectures was on spot welding equipment in which the lecturer was hesitant in several instances in identifying equipment depicted on rather old slides. The other was a lecture on instrumentation in which the lecture was extremely well received, but after which there was very little retention by the group on lecture content. Apparently the use of vendors left much to be desired.

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

   I do not feel qualified to comment. Certainly the staff that met with us was most enthusiastic and dedicated.

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

   In general I would consider the training facilities poor. The housekeeping left much to be desired: the exception was the Standards Laboratory.

   Because of security a majority of the students felt the courses would have been much better away from the Y-12 complex. Any converted warehouse would have been as adequate. It is unfortunate that the teacher participants were led to assume that the filthy conditions of the facilities, with no apparent effort to maintain good housekeeping conditions or shop demeanor and the inoperable equipment were acceptable industrial practices.

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

   Generally speaking the shop and laboratory equipment being installed in the new area vocational schools throughout the south equaled or in some instances exceeds that made available to the Institute. Certainly most of the machine shop equipment was "old hat" to the teachers. The equipment in the standards laboratory was an exception. A discussion of equipment inside the security area seemed to create more frustration than to provide information.

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

   The participants in general voiced satisfaction on both the curriculum and teaching methods used. The majority of the students with whom I talked felt that excessive lecture was used at the expense of "hands on" experience and/or application. It appears that this was necessitated by the constraints of facilities and equipment.

This course seemed to be more concerned with content than coming to grips with the real problems; namely, equipping the teacher with tools to make graduates of vocational programs more employable in their field of training.

On the assumption that all course material can be placed in the categories of nice to know, ought to know, and must know, too little of the content of the curriculum dealt with the latter.

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

   It seems that within the operational objectives of the program real attempts were made to effect coordination.

8. Publications - Are any aspects of the Institute particularly worthy of publication?

   Educational publications that define a process or procedural activity usually do not make a contribution to the state-of-the-art. An analysis of shortcomings, pre-defined perspectives, and redefinition of goals could be useful.

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

Submitted by:

H. D. Jared, State Coordinator
Vocational High School Programs
State of Tennessee

This same concept could apply in any location where upgrading teachers is needed. It is doubtful if the State Department of Education could afford such a program, due to the high cost of this method. As has already been noted, industry must be willing to make available equipment, personnel, and assist in funding.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

   Teachers interviewed by the Panel indicated they benefitted greatly from the Institute. It was indicated that special contact was made to Negro schools in an effort to recruit some Negro teachers. Almost all of the 100 teachers were placed in their first choice. However, a few made their choice outside of their area of teaching responsibility. If this type of institute is to be successful, the State Director of Vocational-Technical Education must assume the leadership necessary to provide future institutes with qualified participants in the area of teaching responsibility. Only those needing and able to profit from the instruction should be permitted to attend.

   It was noted that one of the participants had no intention of returning to his teaching responsibility.

2. Course Content - What are the strengths and weaknesses of the University of Tennessee Education courses offered in the Institute? What are your impressions of the Union Carbide Nuclear Division's Technical courses offered in the Institute?

   It was apparent that considerable effort had been made to design courses both at undergraduate and graduate level, specifically to meet the needs of those enrolled. It was also noted that an attempt was made to closely correlate the education courses with the technical courses. The courses were also structured in such a way for the participants to develop material which will be valuable to them locally as they return to their teaching responsibilities.

   These courses probably could have been conducted by each of the States locally at much less cost.

   The Union Carbide Corporation officials must be commended for their willingness to cooperate by permitting individuals from their operation to make presentations periodically.

   Some of the participants indicated they were getting from the courses exactly what they expected and needed. It would appear that too much time was consumed by lectures with not enough time for application. Several participants indicated the use of vendors was interesting and beneficial but that this could have been accomplished at home. Also, some lectures and demonstrations were too high level and Y-12 oriented.

It was a genuine pleasure to serve as a member of the panel for Evaluation and Advisory Conference of the 1967 In-Service Vocational-Technical Teacher Institute conducted cooperatively by the University of Tennessee, Oak Ridge Associated Universities, and the Y-12 Plant operated by Union Carbide Corporation at Oak Ridge, Tennessee. The responsible persons from these agencies are to be commended for their efforts to make this type of institute successful.

Perhaps the evaluation would have been more comprehensive if those who served on the 1966 Evaluative Panel could have returned for the 1967 evaluation, in order to make some comparison of the two Institutes.

General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

   Probably the most serious problem is getting educators and industry together to plan cooperatively, ways to involve vocational-technical teachers in activities designed to upgrade them on new developments in industry. The need for vocational-technical teachers to keep up-to-date is increasing proportionately as changes in technologies occur in industry.

   It has probably been demonstrated by this teacher training institute that similar activities involving both industry and education is a possible answer to part of the upgrading situation. It is felt that education cannot do it alone and that industry must assume its share of this responsibility financially and physically for in the final result industry will benefit greatly.

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

   The concept of using an industrial setting to train and upgrade instructors is very good provided a well-planned program of activities is carried out which is based on the idea of eliminating the deficiencies of instructors. Using an industrial setting must provide adequate "hands on" application of theory otherwise it will be of little value.

   Industry's participation in such a program will provide for a closer relationship between education and industry. A cooperative situation must exist and as a result industry can expect to get a better trained worker due to acquainting the instructors of new developments and techniques.

   The instructors will feel freer to call on industry for assistance when this cooperative relationship is implemented.

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

   The personnel conducting the Institute are to be highly commended for their untiring efforts.

   It was evident that considerable planning and arrangements had to be made in order for the program to function.

   The ORAU Staff is due special recognition on the overall coordination of the program.

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

   There is not much that can be said regarding the strengths of the facilities in which the Institute was conducted.

   The industrial setting was probably the greatest strength. Classrooms were not sound-proof and noise carried from shop to classroom. Classroom facilities were not up to what is found in most public schools.

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

   In most cases, the equipment made available was not up to the equipment in the new area schools. Participants indicated films were shown on certain sophisticated pieces of equipment but for security reasons was not made available for "hands on" application.

   Some of the physical testing equipment appeared to add quite effectively to the program.

   Modern equipment in machine shop was not operable.

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

   Generally the attempt to balance the theory and application phases met the needs of the participants. However, some indicated there was not enough time for actual "hands on" application. The team approach of presenting information and instruction is excellent, provided those making presentation understand the objectives of the Institute and the objectives of the participants. Being able to draw on experts from Union Carbide added effectiveness to the entire program.

   Most everyone was fairly satisfied with the teaching methods used with the exception of over-use of the lecture method. Lecturing does not necessarily mean that teaching has taken place.

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

   It is felt that much effort was made to tie the education courses very closely with the technical courses. This was evidenced by the amount of instructional material that was developed. Most of which will be of use back in home State.

   It was also noted that special effort was made to coordinate both phases of the Institute by employing one person from each area who attended last year's Institute to act as a liaison between the technical phase and the education phase.

Publication

Are any aspects of the Institute particularly worthy of publication?

It seems that findings regarding results of experimentation and demonstration during this Institute should be publicized.

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

Submitted by:

William G. Loomis, State Director
Vocational Education
State of Oregon
Salem, Oregon

C76] C-77

It is understood that this project has been conducted in keeping with a grant from the U. S. Office of Education, Department of Health, Education and Welfare, and from funds from the U. S. Department of Labor through an interagency agreement with the U. S. Atomic Energy Commission, Oak Ridge Associated Universities, Oak Ridge, Tennessee.

The observations contained in this Program Review are made as a member of a panel invited to evaluate this Institute at Oak Ridge, Tennessee. This review is based upon:

1. The Evaluation and Advisory Conference on August 7-8, 1967
2. An assessment of reports and written material prepared by the Institute staff.
3. A visit on August 7 to the Institute in operation in the Oak Ridge Y-12 plant.

The Institute officials outlined eight questions which they suggested that panel members utilize in preparing their reports. We were advised that we were not expected to pass judgment, in an overall sense, upon the Institute. The primary purpose of this Panel Review, as I understand it, is to make suggestions for improvement, if and when similar programs are developed elsewhere.

I appreciated the opportunity to participate in this Panel Review and commend the Institute staff for their sincere and conscientious efforts to provide for the best possible Institute program in keeping with the Project Proposal. As a member of the Review Panel for the 1966 and 1967 Summer Institutes, I can see definite evidence of program improvement based upon the experience gained by the Institute staff and the suggestions of the Evaluation Panel.

General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

   It is quite generally accepted that a vocational teacher must be proficient in the skills and subject matter he teaches, as well as in the process and methods of teaching. A process somewhat similar to the normal academic process trains teachers in many of the occupational areas for vocational teaching--including provisions for in-service and upgrading such personnel. However, teachers of many trade and industrial and technical occupations follow a different path. The requirement of extensive occupational experience, and the great diversity of fields for which training programs are offered, have necessitated the recruitment of persons with adequate occupational experience, who work as teachers with relatively little preemployment professional training. In-service training must then be provided as the teacher performs his teaching assignment. Major problems facing those concerned with such in-service training, including the upgrading of such personnel, are:

1. Identifying the role of the various agencies and organizations concerned with such activities, including an acceptance of responsibility for these activities. Agencies and organizations concerned include the federal and state agencies for vocational education, designated institutions of higher education, local educational agencies, and employers and employee organizations.

2. Providing for a variety of appropriate in-service experiences for the great diversity of occupational fields represented in the vocational education programs. Such programs must be financially feasible for the sponsoring agencies and the prospective enrollees.

3. Providing for frequent review, evaluation, upgrading and redirection of the program. Although the specific problems are different in each of the occupational categories, effective teacher education is a necessity if the vocational program is to remain most effective and efficient.

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

All states have accepted the provisions of the 1963 Vocational Education Act. It follows that a majority of the vocational-technical programs in the states meet the provisions of this statute in order to participate in the financial benefits. Included within the provisions of this Act are the requirements that vocational and technical programs will be geared to current and projected labor market needs. In implementing these requirements it is necessary that state and local educational agencies designate advisory councils representative of employer and employee groups and other persons familiar with the training needs of employers and with those to be trained. I would assume that such advisory groups will encourage and foster the upgrading of vocational teachers in business and industrial settings whenever it is feasible.

Since industry is the recipient of the product of vocational programs it is to the advantage of industry to cooperate in the initial training and subsequent upgrading of teachers in order to be assured of the best possible product.

The public education sector of government is charged with providing meaningful vocational instruction to all youth and adults in all parts of each state. This means there is a great diversity in the occupational fields represented--and in turn a large number of employers involved. Coordinating this effort is a major undertaking.

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

It seems to me that the availability of facilities and point of view of key industrial personnel at Oak Ridge are atypical. Therefore, the application of the concepts embodying education-industry cooperation will normally need to be modified in other parts of the country. Rather than 8-10 weeks of one-half day periods in an industrial setting it would be my opinion that shorter periods of time, perhaps 6-8 hours per day would be more practical to work out with industry. Several employers might be encouraged to participate with the teachers rotating from one plant to another for a variety of experiences. Professional education courses could probably be offered in the teacher's home state, or at least such offerings kept to one course for purposes of "synthesizing" the industrial experience with the educational process. If interstate projects are undertaken, and I see a real advantage and need for such cooperative effort in order to provide a reasonable number of teachers in various occupational fields, it may be more practical to limit the number of states (perhaps 4 to 6, depending upon state population) in order to provide for a manageable project.

The Vocational Division of the U. S. Office of Education could perhaps assume responsibility for coordinating such projects as a leadership and service activity to the states. This is the role I see Oak Ridge Associated Universities playing in the present Oak Ridge project.

The state agencies for vocational education in each state must be encouraged to play a key role in coordinating the in-state aspects of such projects if they are to be successful. The State Directors of Vocational Education, or their designated representatives, will need to be involved in planning and implementing such projects if they are to be successful, if for no other reason than the financial implications.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

   The selection procedures you were able to follow for the 1967 Institute as compared to the previous year were definitely more effective. By and large, it appeared that the teachers attending this Institute will benefit to a much greater extent than in 1966. Apparently about all of the 100 teachers attending were placed in courses of their first choice. Perhaps the needs of the various enrollees could be met to a greater extent if the program were individualized to a greater extent. After the very commendable selection procedure had been applied, it might have been advantageous to prescribe a schedule of courses (within the offerings available) that took into consideration the peculiar needs of each enrollee. For instance, 8-10 of the Welding and Physical Testing enrollees would have preferred to spend more than one-half day in technical training and it probably would have been advantageous if this could have been done.

2. Course Content - What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute? What are your impressions of the Union Carbide Nuclear Division's technical courses offered in the Institute?

Apparently every effort has been made by the University of Tennessee staff to make the professional education courses meaningful to the enrollees. Central to this effort has been the all-out effort to coordinate these offerings with the technical courses. Consistent with my suggestions made last year regarding this phase of the 1966 Summer Institute, I believe this phase of such an Institute can be reduced to as little as one professional course. Such a course should permit enrollees to adapt technical course experience to the enrollee's teaching needs in his home area. Enrollees should not be required to enroll in professsional courses they have previously acquired in their own state. The regular professional courses can be acquired at less cost to all concerned in their own state.

The effort upon the part of Union Carbide officials to make the technical courses most useful to the enrollees was apparent. It is assumed that these technical courses should be exemplary of what the enrollees should be doing. If we except this premise, then I believe more attention should be given by company officials to utilizing recognized practices and procedures that will be most conducive to the learning process. This should assure all concerned that the most optimum conditions exist in providing for skill and theory development. Vocational educators have acquired valid and reliable experience in organizing and presenting theory and skill content that could be used to a greater advantage on this type of project if Union Carbide officials continue such training programs.

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

   The personnel concerned with conducting the professional education courses and the technical courses doubtless were exceptionally well qualified. Oak Ridge Associated Universities staff are to be commended for their vital role in organizing and coordinating the project.

   The information available to me was not in sufficient detail to make it feasible to assess the qualifications of the various instructional personnel of the Institute. Therefore, my reaction to this question must necessarily be subjective as noted above.

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

   In general, the facilities for the technical courses seemed adequate. If this Institute was, however, to be an exemplary effort, as mentioned previously, some of the equipment - and "housekeeping" practices--were less than desirable. It is probably impractical to assume that one company could emulate all of the most desirable industrial practices to be found in American industry in the occupational fields concerned. For this reason a multi-company effort would seem advantageous.

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

The equipment, particularly in the machine and fabrication area, was not up to the standard found in most public vocational education programs. Another weakness was the lack of a sufficient amount of various types of equipment which would permit enrollees to gain experience on such equipment. It is recognized, of course, that certain sophisticated pieces of equipment could not be made available in volume.

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

   It was apparent that there was a definite improvement in course planning and teaching methods used in the 1967 Institute compared to the 1966 session. The conscientious effort of all concerned to improve the program is commendable.

   In my brief exposure to this project, I still get the impression that the technical course offerings emphasize the lecture method too extensively. Another impression is that there was a tendency in some of the technical course offerings to present rather superficially the unusual or exotic methods and materials being used in industry without linking such presentations to essential supporting theory and day-to-day industrial practices. In making this comment, I do not mean to negate the significance of such presentations in gaining perspective as to industrial developments, and the related inspirational and motivational implications.

   Regardless of the above observations which are intended as constructive suggestions, I gathered the impression that most of the 100 enrollees were fairly well satisfied with the course offerings and methods used. This attitude on the part of the enrollees speaks for itself!

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

   It would seem that all reasonable effort was made to coordinate activities between the technical and education courses. The development of instructional material in the education courses based upon knowledges and skills acquired in the technical courses is evidence of such coordination.

Publication

Are any aspects of the Institute particularly worthy of publication?

In my judgment the experience gained in operating the 1966 and 1967 Institutes should be published and made available to all concerned with the administration and operation of public vocational education programs. Such a publication should aid in the development of more cooperative efforts in this field.

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

Submitted by:

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General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them? Several major factors appear to be creating serious problems in upgrading vocational and technical teachers.

   a. The demands of industry for trained personnel and the expectations of large numbers of people for training opportunities combine to require larger and stronger programs of vocational education. More well trained teachers are needed and enlarged programs and improved methods for training these teachers must be developed to respond in quantity to this need.

   b. The speed of technological change makes continuous upgrading of teachers of vocational and technical subjects absolutely essential. If a worker must be retrained several times in his working life the teacher who helps train him must also be kept up to date. This is particularly true of teachers of industrial skills.

   c. Specialization of work necessitated by increasing technological complexity presents two problems for the vocational teacher. First his own industrial experience may have been specialized or at least not as broad as is desirable. Second he is called on to teach groups of students who will go into a variety of specialties. Therefore the teacher must not only "upgrade" in a particular skill but broaden his understanding of a variety of skills.

   d. In addition to upgrading and broadening his subject matter knowledge the vocational teacher must continue to improve his teaching skills.

   I'm not familiar with all the alternatives for upgrading vocational and technical teachers but it seems to me that these teachers have been neglected in terms of feasible opportunities. No large system of teacher institutes such as the NSF science teacher institutes are available. Fellowships in vocational education may exist but I know of none on any significant scale. Return to industry for upgrading is still the most often heard alternative. I believe that this alternative has some serious deficiencies. It requires relatively long periods of time and personal adjustment. There is no assurance that the industrial experience is not a repeat of experience in the teacher's area of competence. It is unlikely that maximum use is made of his time in upgrading when production demands establish his work experiences. Production experience is valuable but it shouldn't be the only alternative. Industrial participation in in-service training would seem to be an important approach to solution of this problem.

General

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers? In concept the primary advantages to using an industrial setting for upgrading vocational and technical teachers would appear to be:

a. Immediate access to industrial resources of personnel (engineers, technicians, craftsmen, managers) and equipment. Since both equipment and personnel are involved in industrial production the training should have direct relevance to industrial practices. However, general application of a particular industry's process may not be possible and care is needed to avoid a training environment peculiar to only one plant.

b. The industrial environment. The training in this environment would seem to be potentially more vital than training in simulated situations. A strong sense of the relationships of training to employment should give a special focus to the training.

c. The involvement of industrial management and labor. Vocational education needs the support of industry—management and labor—to achieve the position in American education that it deserves. The actual involvement of industry in training of teachers is an excellent way to achieve this support and develop a greater awareness of the needs of vocational education and its teachers.

The necessity of training in the industrial setting is a major tenet of vocational education in regard to industrial subjects. This is clear in the experience requirements for teachers of these subjects and the policies of returning to industry for employment periods to refresh and update skills. The difference in the question at hand is the use of the industrial setting for institutional training. I was particularly impressed with the testimony of the drafting teacher who compared the TAT experience to a recent "return to industry" experience. He found his employment by industry utilized his already acquired skills rather than giving him new ones. The TAT program gave him a breadth that included some areas where he was weak. The TAT type program would appear to be a logical and very desirable extension of the role of industry in preparing and upgrading the teachers who are training many of their future employees.

Industrial benefits from participating in such upgrading programs include:

a. The most obvious benefit is the potential impact of training a teacher in industrial processes on his students who are potential employees of the industry.

b. A direct benefit to industry is the association with teachers by industrial personnel. Learning occurs on both sides and industry may benefit in learning more about training and about other industrial processes with which the teachers are familiar.

c. Industry can find a way through participation to utilize its resources to help meet a social need and thereby generally improve their environment.

General

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

Institutes for in-service training of vocational and technical teachers are needed and will be needed in greater quantity, quality and diversity in all parts of the country. Certainly the combining of university, industrial, and vocational education resources for this training is highly desirable for teachers of industrial trade and technician subjects. TAT is a prototype from which many individual variations can and should be developed.

One of the difficulties is the lack of any regional vocational education systems or institutions. TAT has drawn teachers from ten states because it is funded as an experimental research program and therefore knows no state boundaries. However, vocational education programs including teacher training is a distinctly state function and outside of experimental research funds any interstate activity would require special interstate cooperation. I would like to see a variety of institutes offering more or less specialized training associated with the industries that can best contribute to that particular training. These institutes should be available across state lines to teachers with the particular training needs and interests served by the various programs. The NSF institutes for science teachers offer a useful pattern.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

   Teacher selection through state departments of vocational education appeared to be greatly improved this year and as a whole the group seemed to be appropriate for the training program. Some individuals apparently didn't respond with complete satisfaction and may have received limited benefit but most seemed to have benefited.

   The four areas of training (counting welding and physical testing as one) indicate the variety of industrial resources which can be applied to training. This is a desirable feature of the experimental program. However, it may be that smaller groups of trainees with more homogeneous interests, needs and experiences would be more feasible in a continuing program involving a variety of industrial-university situations.

TAT Operation

2. Course Content - What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute? What are the impressions of the Union Carbide Nuclear Division's technical courses offered in the Institute?

   The University of Tennessee is to be commended for the special efforts made to relate the education courses to the industrial laboratory experience. This appears to have been very successful and to have added greatly to the improvement of this year's program over last year's. It seemed evident that the majority of teachers received help in methods and particularly in develoment of useful material for application in their classrooms. The 25 units prepared by trainees in each area were particularly impressive.

   Those courses or parts of courses which had little or nothing to do with the application or understanding of the technical material might be questioned. For example the demonstration by outside vendors may have been unnecessary to the extent provided in the TAT context. On the other hand teachers seemed to respond particularly well to presentations by Dr. Childers and Mary Ellis.

A minimum of these "extras" is probably necessary to give teachers a well rounded program but if full advantage is to be taken of the industrial setting the emphasis should be on interpretation, application and planning of technical material for classroom use.

The technical courses offered by Union Carbide Nuclear Division appeared to be sound in scope and depth with enough flexibility for teachers with varying backgrounds and needs. The response of teachers in all areas but drafting was highly enthusiastic in regard to content and even in drafting over 50% rated content as higher than average.

TAT Operation

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

One of the most notable features of the TAT program is the quality and variety of industrial personnel involved. There is no question of technical competence or relevance to industrial practice. The question on the industrial personnel is their ability to communicate their technical know-how to teachers in a meaningful and useful way. This seems to have been accomplished to a very high degree. One occasionally glimpses a tension between the UCC-ND instructor in his dual role as a supervisor giving direction and as a faculty member of the Institute participating in a learning experience. Training of the industrial personnel in teaching philosophy and methods is important. The University staff should play a strong role in creating a "sense of faculty" on the part of the entire staff.

Individually the personnel involved appeared to be very competent and dedicated. The program does not appear to be fully integrated yet although it seems much more so than last year.

TAT Operation

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

The facilities were adequate for the program but in some cases laboratory areas were not as much an integral part of the industrial operation as might be desired. Where full scale industrial facilities were used such as the electronics area the training seemed to be strengthened. Classroom arrangement didn't appear to be the best and some note was made of lack of access to facilities specially designed for training in methods and materials. Perhaps some sessions on campus should be considered.

TAT Operation

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

Several instances of equipment malfunction or nonfunction were noted, however, attention drawn to problems shouldn't obscure the general picture. The equipment made available was certainly relevant and appeared to be varied enough to avoid over specilization on a particular industry. Response seemed to be greatest to equipment or processes that were new to the teachers' experience and yet could be included physically or otherwise in their home classroom situation.

Some of the criticism seemed to be inconsistent in regard to equipment; "If it is equipment already in the school why go to industry to learn about it?" "If the school doesn't have it and is not likely to afford it how can learning its use be applied to the classroom situation?" "More time is needed to actually use equipment!" "More time is needed to see a greater variety of machines perhaps in other industries!" All of these pressures must be balanced within the time, scope and purposes of an institute. The valuable feature of the equipment made available is that it is industrial equipment actually used in modern industry. Insofar as more sophisticated equipment could not be viewed because of security restrictions the program did not reach its greatest potential. However, this is not seen as in any way invalidating the training or the experiment in industrial involvement.

TAT Operation

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

   I am not competent in this area but from results must assume that methods and curriculum were effective last year and even more effective this year. The combination of lecture, laboratory, seminar, individual study and counseling seemed well planned and executed. The teachers' responses to this question indicate areas of strength and weakness. As mentioned above the efforts toward integration of technical material with education courses is especially noteworthy.

   The use of guidance and counseling for this group was not too well defined as to purpose or scope. It appeared, in part at least, to be more of an opportunity for individual research and training by the staff than as an integral part of the training program. Some clarification and analysis is needed before the role of guidance and counseling in this situation can be assessed.

TAT Operation

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

   This has been dealt with above. While the coordination of courses is evident one still senses a lack of full integration of the staffs of the University and UCC-ND in regard to planning, preparation of personnel and materials, evaluation and program development. The part played by ORAU in putting the program together and coordinating its parts has been absolutely essential and well done. However, it may be that this role to some extent has inhibited a closer integration of the University and industrial staffs. As ORAU's role becomes less direct and the program matures the integration of training staffs may reach a higher level.

Publication

Are any aspects of the Institute particularly worthy of publication?

The experiment and results should be publicized well to stimulate greater attention to industry-education relationships. In addition special publications might be considered covering newer course material such as in the area of physical testing, industrial benefits from participation in teacher training, the application of industrial training to classroom teaching or the cooperation of industry and education in planning vocational-technical curriculum.

EVALUATION PANEL REPORT

Summer 1967 Vocational-Technical Teacher Institute

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I was happy to serve as a member of the panel for the Evaluation and Advisory Conference of the 1967 In-Service Vocational-Technical Teacher Institute conducted by the University of Tennessee under the auspices of the Oak Ridge Associated Universities and trust that these thoughts will be beneficial in the further development of the program.

General

1. Need - What are the most serious problems in upgrading vocational and technical teachers? What alternatives are there to deal with them?

Of the numerous problems involved in upgrading vocational technical teachers some of the most serious are:

a. Recruitment of a large enough group engaged in the same occupational training area to warrant establishment and operation of an adequate program designed to meet their specific teacher training needs.

Because of varying background and recency of employment, years of teaching experience, type of equipment and facilities at the teacher's disposal, professional training (college teacher training courses completed) and professional reading, it is most difficult to develop an in-service teacher training program that is not "old stuff" to many vocational technical teachers who need and should participate in an upgrading program.

b. The inability of a group, or individual teachers, to finance themselves without assistance for any extented period of time even though they see a need for and have a desire to upgrade themselves.

c. The number of occupational training areas involved in the Vocational Technical Training Programs of the States and cities needing, demanding, and crying for teacher training programs specifically designed to meet their needs.

Among the alternatives for dealing with some of these Vocational Technical Teacher Training problems involved in upgrading professional personnel, it would seem:

a. That for most occupational training areas a larger base than the State must be sought. That is the Regional programs and in many occupational areas, national programs must be developed to attract the numbers of teachers needed to support the program. Even then the programs will have a tendency to become less and less specific to individual needs as time progresses.

b. That for a majority, financial assistance must be provided.

c. The industrial, or in-plant training portion of such an in-service teacher training program must involve each individual teacher being on the industries payroll while in the plant, for maximum benefit. To update work attitudes, concepts, habits, team-work, and stick-to-it-ive-ness there are no alternatives.

d. Scholarships, grants, fellowships, internships, apprenticeships, and cooperative training concepts of occupational training may have to be resorted to for adequate in-service upgrading in lieu of company employee status but in so doing many desired attributes will have to be wavied.

e. Whatever means of financial help is finally decided upon it must be sufficiently ample, that when added to the incentive created by the State's Teacher Training, certification and upgrading requirements will attract and hold the teacher periodically to completion of such an in-service upgrading teacher training program.

General

2. Concept - What are the merits of upgrading vocational and technical teachers in an industrial setting? What are the merits to industry for participation in upgrading programs for vocational and technical teachers?

Vocational technical teacher training programs conducted in truly bona fide industrial atmosphere should be greatly enhanced. Some prime purposes for conducting programs in an industrial setting are:

a. To upgrade present skills, methods and procedures of the teacher for doing the work through first hand practice.

b. To acquaint the teachers with new equipment in use by actually operating such equipment. Also, to acquaint the teacher with new materials, processes, trade practices, and methods used in modern production.

c. To provide an opportunity to the teacher to work under the supervision, guidance and direction of top-flite industrial personnel on the firing line.

d. To provide real, live, modern, up-to-date experience under the actual competitive conditions of present day employment.

Industry should gain a much better knowledge and understanding of the requirements of and problems involved in training vocational technical teachers. Such cooperation in a teacher training program should assist them in building confidence in the vocational technical program, and, from a more selfish point of view, give industry an opportunity to recruit new and additional leadership which is all well and good in that the basic purpose of vocational technical education is to train, retrain and upgrade people for employment.

General

3. Application - What applications of this concept or several concepts would you recommend for other locations in the country?

Leading vocational technical teacher training colleges and universities must be encouraged, shown the way, and assisted in developing industry oriented in-service and upgrading programs:

a. For as many occupational training areas as the needs of their State will justify.

b. For the benefit of specific groups of teachers of neighboring States, or the Region and in some instances the Nation.

Unless the States can be shown and convinced of the merits of cooperating in Regional endeavors such may come to naught.

TAT Operation

1. Teacher Selection - Was the selected group of vocational and technical teachers able to benefit from the TAT Institute program?

   The selected group of teachers in the machine shop program seemingly had practical experience and were employed as machine shop teachers, thus should have benefited from the program.

   The selection of participants in the other three occupational areas turned out to be surprisingly faulty and of little real purpose except to fill the class, an old in-service teacher training problem of most institutions that has no practical purpose except to confuse and build false hopes in the student.

   The TAT Institute, the team was requested to evaluate, was designed to function as an in-service upgrading teacher training program for four groups of employed vocational-technical teachers. The selection process circumvented the participants' jobs, training and employment experience as entrance qualifications, therefore, the program lost its effectiveness to perform the functions for which it was established and operated.

TAT Operation

2. Course Content - What are the strengths and weaknesses of the University of Tennessee education courses offered in the Institute? What are your impressions of the Union Carbide Nuclear Division's technical courses offered in the Institute?

   From staff reports a number of suggestions for improvement were gleaned from last year's (66) in-service teacher-training evaluations by both both the UT and Carbide personnel working in the program. The group is to be commended on their efforts in endeavoring to make the program as practical as possible with the security handicap under which they were forced to work.

   The development of a quantity of master drawings, charts, math problems, formulas and other teaching aids from which each teacher could reproduce a number of transparencies after he got home, for use in his own program, is noteworthy and commendable.

   The required revision, updating, modernization and improvement of each teacher's course outline and lesson plans to make them more practical and usable in terms of today's industrial practices when they get back home is encouraging.

   It is certainly to be hoped that this VEA: 63, IVC research and demonstration project makes provisions for adequate follow-up of the teachers on the job to cinch this instruction and to improve the materials and methods used. This should be of considerable benefit to both the student teachers and the staffs looking toward still further refinement and planning for the future.

There were some rumblings from the student teachers which should serve as guide posts for the further improvement of future in-service teacher training programs. These inferred that:

a. Arrangements must be made for first-hand individual practice under modern production and actual working conditions in a bona fide industrial plant.

b. Each teacher (on both the UT and Carbide staff) must be required to up-date his own course outline, instructional aids and teaching methods before the next session.

c. The University of Tennessee, College of Education, Department of Vocational Teacher Training must be sure that each teacher is a Master Critic Teacher and that they practice what they preach.

TAT Operation

3. Personnel - What are the strengths and weaknesses of the personnel used to conduct the Institute?

This panelist doesn't recall that the panel was apprised of the qualifications of the professional personnel used in the conduct of the Institute.

Considering that a teacher can no more teach something he has not actually experienced or can't do himself than he can come back from some place he has never been,

a. It would be hoped that this in-service teacher training staff was better selected for their respective jobs in the Institute than the selection procedures used in placing some of the student teachers in the various phases of the program.

b. Seemingly some of the in-service student teachers in last year's (1966) program were no better selected than some of this year's nor were they any better selected to serve as teacher-aides or coordinators.

c. It is assumed that those staff members who were employed by Carbide as a part of their staff were well qualified for their production work through considerable training and experience. Such experience and training both on-the-job and of a related technical nature are essential for both production workers and vocational technical teachers.

For a vocational technical program, academic training alone is not enough—nor is just industrial or employment experience.

The selection and placement of vocational technical in-service teacher training program staff personnel is even more critical.

On top of all this, how well was each teacher trainer on the teacher training staff prepared for his job?

a. Had he completed a teacher training program of a similar nature to that offered in this Institute?

b. Was he a master teacher in his occupational area?

c. Was he adequately prepared to serve as a critic teacher in this teacher training program?

This writer is of the opinion that the panel did not have the numerous answers to the question of "strengths and weaknesses of the personnel."

Certainly the Institute was guilty of many of the weaknesses in vocational technical teacher training programs that many vocational teacher training programs have endeavored to avoid over the years.

TAT Operation

4. Facilities - What are the strengths and weaknesses of the training facilities used during the Institute?

The training facility used for the program was warehouse space made into shop, laboratory and classroom facilities. The space was by far much poorer for classroom use than for shop or laboratory purposes.

The shopkeeping and housekeeping practiced didn't represent modern industrial practices, UT standards, correct habit forming procedures, nor good teacher training impressions for the student teachers to adopt in their classrooms.

Many of the better vocational-technical schools of this Region and Nation insist on their instructional staff wearing a shop coat with an identification badge. Students are encouraged to wear some type of uniform, usually different for each program.

The electronic instrument and physical testing laboratories appeared to be actual plant equipment facilities and not often found duplicated in vocational technical schools. We hope these student teachers have an opportunity to put their training into practice.

It seemed that the other shop areas used in the training program were somewhat removed from actual plant or industrial situations, thus, the use of these facilities accomplished little by being located just within the fence of the Y-12 area at Oak Ridge. They had just as well, or better, have been on the University of Tennessee campus in Knoxville or in one of the State's new, modern area vocational-technical schools where similar industrial production type equipment is to be found.

Because of "Security" the trainees weren't permitted into the production area of the plant even to observe modern production, let alone to try their hand under actual working conditions. The unavailable "taped machines" for actual practice for which the program was advertised so highly was the source of loud continuous gripes on the part of the teacher training students. To several students this was the upgrading for which they had come but failed to get.

TAT Operation

5. Equipment - What are your impressions of the shop and laboratory equipment made available to the Institute?

The shop and laboratory equipment in all instances appeared to be regular industrial production equipment. The arrangements simulated that of good industrial, or production practices.

Relatively little or no actual production took place on most of the equipment. It was placed there for training—for the TAT program. Therefore, the teacher training students, even under this implied industrial atmosphere or environment, didn't seem to gain much that a similar program located on the UT campus or in an area school facility would have.

TAT Operation

6. Curriculum and Methods - What are the strengths and weaknesses of the curriculum and teaching methods used during the Institute?

CURRICULUM

The Teacher training institution phase

The Institute curriculum had been adopted for this (1967) year's Institute to better meet the needs of the group from last year's student teacher comments and the evaluative panel's recommendations. Most student teachers seemed to feel that this year's curriculum was pretty well designed to help them improve their programs, for this we commend the Institute staff.

The biggest student gripe, at least among the machinist and draftsman groups, was of the Institute's inability to give them the practical upgrading training they had been led to believe they would get if they attended.

This year's Institute has, in its efforts to be practical and to meet the needs of the student teachers, adopted or perhaps readopted a curriculum that cut across the entire gamut of a good industrial education or a vocational-technical in-service teacher training program curriculum. This problem has given leaders in vocational education on all levels many headaches throughout the years. General, "made to order" courses, have a tendency to get in the way before degree granting or recertification time comes around with the song "I've had that before" or some similar argument.

In analyzing the University of Tennessee's course outline for their portion of this effort at industry orientated vocational technical in-service teacher training institute, one comes up with:

a. That only one half-day was devoted to a field trip—to the UT campus to visit the "Planning Laboratory." Why not more industrial visits as a part of the teacher training upgrading program?

b. Two days were devoted to registration and orientation and one day to final examinations.

c. Twenty-three of the UT half-days of the possible thirty-eight—eight week—course was handled largely by others than the Institute's staff; such as:

(1) Lecturers on the total vocational technical program as conducted under the several National vocational education acts.

(2) Demonstrators of equipment and supplies; commercial products, their use in the classroom, shop or laboratory as an aid in improving teaching and expediting learing.

(3) Lecturers on professional and student organizations and professional research.

Thus the staff assumed full responsibilities for only about 30 - 35% of their time.

The points this writer wishes to raise from this analysis of the UT phase of this in-service teacher training institute are as follows:

a. What advantages were attained in holding this part of the program at Oak Ridge _just_ to be _inside_ the Y-12 fence?

Couldn't this phase just as well have been on the UT campus?

Certainly the classroom facilities would have been more adequate and conducive to fulfill the purposes of this outline.

b. With seemingly no more industrial application or tie-in than was apparent—why couldn't the two phases be separated and each put on a full-time basis and even more concentrated into say a three week program? Such a plan would be easier to finance.

The cooperating industry's phase

In analyzing the Union Carbide phase of the program, several facts are raised about their justification or advantage behind the Y-12 fence. Some of these are as follows:

a. Since the entire program had to be set up in _simulated training_ situations rather than an actual in-plant, industrial, or production situations; why for training purposes couldn't the same accomplishments have been attained in at least three of the four occupational areas:

(1) In the UT campus shops?

(2) In one of the new State area vocational-technical schools?

Approximately the same industrial production type equipment is found in these shcools' facilities. It would probably have been about as easy to move the teacher-trainers as the student teachers.

b. Why couldn't the objectives of this phase of the program also have been accomplished in three or four week periods on a full time basis?

c. As competitive and varied as industries are—a person would wonder why field trips were not taken to other industries in the Knoxville area to see and gain a still better understanding of industrial procedures and processes as part of the upgrading program.

METHODS

It is interesting to read the summary of the student-teacher's comments regarding the methods used by the teacher-trainers. While we have all heard most of these on numerous occasions in spite of everything we could do—they have some validity and must ever serve to keep programs on their toes.

There is just too much "Do as I say, not as I do" about too many teacher training programs, particularly those designed as in-service programs.

Again, it is most difficult (almost impossible) to meet the in-service teacher-training needs of experienced teachers when the enrollment is diluted with those not engaged in the same occupational area for which the program is designed. This too, is an old unsolved industrial teacher training problem that is still with us.

The teaching methods used by critic-teachers in all teacher training programs must by their very nature be almost perfect examples of good teaching, because they are offered as examples and invariably are those used by the student teachers when they get back home. Therefore, it is most important that the critic-teachers be well prepared before starting such a program.

TAT Operation

7. Coordination - What are your impressions of the coordination between the technical and education courses in the Institute?

The idea is good, if the costs can be justified.

The "Aide's" work seemed to be held in pretty high esteem.

It is hoped they would serve well in the development and conduct of the in-service teacher training program and not just an errand boy.

Again, in the selection of the five aides, as in the selection of the student teachers for the occupational area programs a more firm adherence to good standards of vocational-technical education qualifications of personnel is a necessity.

Publication - Are any aspects of the Institute particularly worthy of publication?

This writer would assume so. In fact, it is to be hoped so in order to help other programs be aware of pitfalls, difficulties and shortcomings as well as good points in the planning, development and conduct of similar industry cooperative or oriented in-service teacher training programs.

It would also be hoped that any such publications present true pictures of the problems and the costs involved. That a publication would offer suggestions to be anticipated, dealing with private industries for cooperation and support in such programs.

It should be remembered that this isn't the first attempt at developing vocational technical in-service up-grading teacher training programs in cooperation with industry and that there are many problems unsolved.

While this program is a step in the right direction and more solutions need to be found:

a. This program contains almost all the pitfalls it is designed to alleviate.

b. A similar program seeking the cooperation and assistance of private industry will face a somewhat different set of circumstances than many faced in this Government sponsored industry.

c. That without a sizeable research grant for instruction and subsistence of the students it will be difficult to finance such a program.

d. The industry phase must be much, much more practical. Just to talk about new methods of industry, new equipment, and new materials for and of production, or to demonstrate such is not enough. Each trainee, to be up-graded, must try his hand at it under actual production conditions.

To have such a program just inside an industrial plant fence doesn't seem enough—Security or no Security. If this situation can't be corrected for another year, then other arrangements should be made.

e. The in-service teacher training standards must be strengthened and then rigidly adhered to.

f. The program should be a better example of how and what to teach by Master teachers.

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1966 In-Service Institute

Follow-up Questionnaire

PREFACE

This survey report on the 1966 In-Service Vocational-Technical Institute conducted as part of the Training and Technology Project was prepared by John C. Hamel, project Experimentation and Training Coordinator.

FOREWORD

As part of the follow-up evaluation of the 1966 In-Service Vocational Technical Teacher Institute a questionnaire was sent to the 60 participants in the program in January, 1967, to help determine the value of the institute to the teachers as a personally enriching experience and in teaching. (Copies of the questionnaire are included as an appendix to this report).

Each participant in the institute enrolled in two of five industrial education courses which were conducted each morning. At noon each day a one-hour seminar covering a broad range of technical subjects was held for the entire group. The remainder of the afternoon was devoted to classroom and laboratory or shop work in the three technical specialty areas - Machine Shop and Fabrication, Mechanical Technology and Drafting, and Industrial Electronics and Maintenance.

Each questionnaire contained four sections covering General Information, Industrial Education Courses, Industrial Technology classes and labs and Seminars. In the General Information section each person was asked to rate on a five-point scale ranging from "very worthwhile" to "of no value" the concept of the institute and such activities as orientation, testing, and counseling. In addition participants were asked to give value ratings to a number of study areas not included in the institute but which they had suggested in previous surveys. They also were asked to state whether or not they had made use of the information in their home teaching situations, to describe ways in which they had used it and to give any general comments on the program.

The other three sections asked the participants to rate on a five-point scale each topic or study segment covered in the classes and seminars.

Forty-seven questionnaires were returned from the 60 participants. A letter was received indicating that T. L. Anglin was killed in an automobile accident in October. The questionnaires returned represent 79.7 per cent of the 1966 in-service teachers.

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SECTION I

GENERAL INFORMATION

Of the 47 participants who returned questionnaires, 46 completed all or part of the section on "General Information." The 46 consisted of 17 enrolled in the machine shop course, 15 in drafting and 14 in electronics.

The concept of providing in-service teacher training in an industrial setting was rated "very worthwhile" by all groups. All drafting and electronics instructors who attended and 14 of 17 machine shop instructors rated the concept "very worthwhile," and the other three machine shop participants rated it "worthwhile."

The orientation sessions to Oak Ridge and the plant area were termed "worthwhile" by all three groups, although the pre-institute information concerning the program was termed only "moderately worthwhile" by all three.

The testing sessions and the return of test results were rated "moderately worthwhile" by all groups as were the individual and group counseling sessions.

The drafting and electronics instructors indicated they would consider time devoted to college credit science and technology classes "very worthwhile" and machine shop instructors reported they would consider the classes "worthwhile." To a question asking if they would consider college credit mathematics courses of value, all three groups responded with high "worthwhile" ratings. Asked about college credit English classes, all three responded with low "worthwhile" ratings.

Of the 47 participants who returned questionnaires, 43 stated that they had used information and ideas from the institute in their teaching or in development of their careers. Two--one in drafting and one in electronics--said they had not used the material, while two others--one in drafting and one in electronics--did not reply to the question.

Nearly all of the 43 who replied affirmatively indicated they had initiated curriculum revisions as a result of the institute. A few said they had made major changes, such as new courses or added sequences within existing courses, while most of the others indicated they were frequently using the material to supplement and update their existing materials. Several said they had reorganized their shops and laboratories as a result of the institute.

Handout materials received from institute instructors were apparently valuable to the teachers in relating the materials, since several specifically referred to these in citing how they had used institute information in their teaching situations.

And, while the University of Tennessee methodology courses were considered inadequate by some teachers (as indicated in answers to other parts of the questionnaire) others apparently found them quite beneficial. Several mentioned they had obtained new equipment and prepared new visual aids materials as a result of the visual aids course. One mentioned he had started leadership conferences in the classroom as a result of the conference leadership course.

However, most of the teachers indicated the primary benefit of the institute was the technical information they received on the latest industrial techniques.

Individual topics most frequently mentioned by drafting instructors included true position dimensioning, parts programming and value engineering. Such related subjects as welding and physical testing also were listed.

A number of electronics instructors stated that as a result of the institute they have placed new emphasis on computer circuitry and its related mathematics, including binary mathematics and Boolean algebra. Other electronics topics listed included printed circuits and instrumentation systems for numerically controlled tools. One teacher stated that as a result of the institute he had shifted the emphasis in his curriculum from vacuum tubes to solid state devices, while another said the institute had prompted him to enroll in courses in X-ray and gamma ray instrumentation at his state university.

Topics most frequently mentioned by machine shop teachers included numerically controlled machine tools, metallurgy and metallurgical inspection techniques and tracer controlled tools. One said he has placed new emphasis on related shop mathematics, while two said they have put added stress on tolerances and measuring devices.

A question inviting general comment on the institute brought a number of suggestions for improving the University of Tennessee offerings. Included were suggestions that the industrial education courses be made optional, that they be revised to more nearly compliment the technical courses conducted by Union Carbide and that other courses be offered including mathematics and science. A number of teachers suggested that the Carbide courses place more emphasis on laboratory and shop practice. Several also suggested that selection procedures be revised to obtain a more nearly homogeneous group of participants.

TABLE I

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF THE INSTITUTE AND OF PREVIOUS SURVEY SUGGESTIONS REGARDING COURSE OFFERINGS

TOPICS	Composite of All Groups	Electronics	Drafting	Machinist
Responses in Each Category	46*	14*	15	17
1. The concept of providing in-service teacher training in an industrial setting is	98.4	100	100	95.6
2. The orientation sessions (to Oak Ridge, the plant and area) were	83.2	80.4	85	83.8
3. Time devoted to college credit mathematics classes would be	84.8	85.7	81.7	86.8
4. Time devoted to college credit English classes would be	66.8	69.6	68.3	63.2
5. Time devoted to college credit science and technology classes would be	87	87.5	91.7	82.3
6. The pre-institute information concerning the program was	59.4	57.1	58.9	61.8
7. The testing sessions and the return of test results were	54.3	44.6	61.7	55.9
8. The individual and group counseling sessions were	52.7	44.6	50	61.8

SCALE: 87.5 - 100 - VERY WORTHWHILE
62.5 - 87.4 - WORTHWHILE
37.5 - 62.4 - MODERATELY WORTHWHILE
12.5 - 37.4 - OF LITTLE VALUE
0 - 12.4 - OF NO VALUE

*One Electronics instructor returned questionnaire but did not complete this section.

SECTION II

Industrial Education Responses

The attitude surveys administered during the institute gave the impression that many students were repeating courses in vocational education. Responses to this follow-up survey indicates that 7 out of 47 or 14.9% had taken both education courses previously, 9 out of 47 or 19.1% had taken one of the education courses previously and 28 out of 47 or 59.6% did not repeat an education course. Three respondents did not indicate whether they had repeated any education courses. Approximately 1/3 of the participants repeated one or more education courses.

Following is an analysis of each education class indicating the strong and weak features as evaluated by the in-service teacher participants. Some of the contradicting comments which came from the earlier attitude surveys can now be explained by the topical analysis. Three of the five education courses: Methods of Teaching Shop and Related Subjects (Tables V and VI), Curriculum Building In Trade and Industrial Subjects (Tables VII and VIII), and Conference Leadership (Tables IX and X) were rated much higher by one subject area than the ratings of the other areas. However, no average valuation by any group of teachers of any topic fell in the areas "of little value" or "of no value". In future planning, careful analysis should be made of those topics that had responses in the lower part of the "moderately worthwhile" ratings.

Two tables on each subject were compiled to differentiate the worth of the class as it related to the participants' teaching skills and to their personal growth. It was found that a close similarity existed between the responses on both tables.

This survey indicated some significant differences between the responses of teachers in the three subject areas. New questions have been raised, which will require additional analysis, as to the specific reasons the trainees responded with differences. Variables such as educational background, years of teaching, types of schools in which they teach and the sophistication of the subjects they teach will have to be considered.

The response differences lend support to the often stated pedagogical axiom that to be highly effective, a teacher needs to gear the material to the initial interests and the needs of his students.

SHOP ORGANIZATION AND MANAGEMENT, INDUSTRIAL EDUCATION 3310

None of the 13 questionnaires returned out of 17 members of this class, had taken a similar class before in a college or university.

By assigning numerical values to the responses and then computing the average it was found that all topics of this class received a "Worthwhile" or a "Very Worthwhile" rating as shown in the following tables.

TABLE I

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING SITUATION IN SHOP ORGANIZATION AND MANAGEMENT INDUSTRIAL EDUCATION 3310

TOPICS	Composite of All Groups	Machinist	Electronics	Drafting
Responses in Each Category	13	4	4	5
1. Notebook required and graded	77.0	85.0	68.8	75.0
2. Characteristics of a good shop teacher	96.1	100	100	90.0
3. Qualities and work habits of a good vocational-technical teacher	94.2	100	93.8	90.0
4. Competencies needed by a trade teacher	94.2	100	93.8	90.0
5. Comparison of a school shop to a commercial shop	94.2	100	100	85.0
6. Visual aids used in shop teaching	96.1	100	93.8	95.0
7. Visual Aid Demonstration by 3M	84.6	80.0	81.3	90.0
8. Shop organization and management procedures	92.3	100	93.8	85.0
9. Visual Aid Demonstration by K & E	82.7	80.0	75.0	90.0
10. Planning a shop--shop planning packet	82.7	90.0	81.3	80.0
11. Student prepared shop layout of their shop	84.6	85.0	87.5	85.0
12. Oral reports over shop related subjects	88.5	95.0	87.5	85.0
13. Extensive class discussion concerning common shop teaching problems	98.1	95.0	100	100
14. Shared Management Procedures	96.1	90.0	100	95.0
15. Safe Practices	96.1	100	93.8	95.0
16. Related Handout Material	90.4	100	87.5	85.0
GENERAL ACCEPTANCE	90.4	93.8	89.9	88.5

SCALE: 87.5 - 100 , VERY WORTHWHILE
62.5 - 87.4, WORTHWHILE
37.5 - 62.4, MODERATELY WORTHWHILE
12.5 - 37.4, OF LITTLE VALUE
0 - 12.4, OF NO VALUE

TABLE II

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF
TOPICS FOR A PERSONAL BROADENING EXPERIENCE
IN SHOP ORGANIZATION AND MANAGEMENT
INDUSTRIAL EDUCATION 3310

	TOPICS	Composite of All Groups	Machinist	Electronics	Drafting
	Responses in Each Category	13	4	4	5
1.	Notebook required and graded	78.9	95.0	68.8	75.0
2.	Characteristics of a good shop teacher	96.1	100	100	90.0
3.	Qualities and work habits of a good vocational-technical teacher.	94.2	100	93.8	90.0
4.	Competencies needed by a trade teacher	94.2	100	93.8	90.0
5.	Comparison of a school shop to a commercial shop	96.1	100	100	90.0
6.	Visual aids used in shop teaching.	94.2	100	93.8	90.0
7.	Visual Aid Demonstration by 3M	86.5	85.0	87.5	90.0
8.	Shop organization and management procedures.	94.2	100	93.8	90.0
9.	Visual Aid Demonstration by K & E	84.6	80.0	81.3	90.0
10.	Planning a shop - shop planning packet	88.5	95.0	93.8	80.0
11.	Student prepared shop layout of their shop	88.5	95.0	87.5	85.0
12.	Oral Reports over shop related subjects.	90.4	95.0	100	80.0
13.	Extensive class discussion concerning common shop teaching problems.	100	100	100	100
14.	Shared Management Procedures	98.1	100	100	95.0
15.	Safe Practices	94.2	100	87.5	95.0
16.	Related Handout Material	90.4	100	87.5	85.0
	General Acceptance	91.8	96.6	91.8	88.5

SCALE: 87.5 - 100 , VERY WORTHWHILE
62.5 - 87.4, WORTHWHILE
37.5 - 62.4, MODERATELY WORTHWHILE
12.5 - 37.4, OF LITTLE VALUE
0 - 12.4, OF NO VALUE

The most outstanding topic of the class was: Extensive class discussion concerning common shop teaching problems, (Item 13). The least rewarding topic was: Notebook required and graded, (Item 1). All topics, however, received a strong "worthwhile" or "very worthwhile" rating and many were in the 90 point category out of a possible 100. The machinist group found this class especially valuable - as shown by their general acceptance rating.

AUDIO-VISUAL MATERIALS AND METHODS FOR SHOP AND RELATED SUBJECTS, INDUSTRIAL EDUCATION 3320, 3330

Fourteen of the 30 members of this class of 38, who returned questionnaires, had taken a similar class before in a college or university. Their responses have been computed separately to determine if repeating the class had any effect on the "worthwhileness" of the class.

By assigning numerical values to the responses and then computing the averages it was found that the total class response placed all topics in the "worthwhile" category. The teachers, who repeated the course, generally gave higher value ratings to the topics than the other class members did, as shown in Tables III and IV. It will be noted that the general acceptance of repeating teachers was somewhat better than that of teachers taking the course for the first time. A "very worthwhile" rating was made by the repeating teachers on the topics of "overhead projector" (Item 6) and "transparency preparation and use" (Item 9).

The machinist teachers rated the topic on the "overhead projector" and the 3M and K & E Company demonstrations "very worthwhile". This high a rating was not given by the electronics and drafting participants who indicated a "worthwhile" rating for these topics.

The most outstanding topics of the class were: "overhead projector" and "transparency preparation and use". The least rewarding topics with a rating of "worthwhile" were: "graded notebook required for future reference" (Item 1), "charts and posters" (Item 13) and "practical exercises" (Item 14) as shown in Tables III and IV.

TABLE III

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING SITUATION IN AUDIO-VISUAL MATERIALS AND METHODS FOR SHOP AND RELATED SUBJECTS, INDUSTRIAL EDUCATION 3320, 3330

TOPICS	Composite of All Groups	Participants who Repeated Class	Machinist	Electronics	Drafting
Responses in each Category	30	14	9	9	12
1. Graded Notebook required for future reference	62.9	69.6	66.7	65.6	58.3
2. Theory and purpose of Audio Visual.	78.5	80.4	72.2	81.3	81.8
3. Use of the various instructional aids	82.8	85.7	86.1	81.3	81.2
4. Characteristics of a good Visual Aid	77.6	82.1	75.0	81.3	77.1
5. Classification of Aids.	69.0	71.5	61.1	75.0	70.8
6. Overhead Projector.	86.2	89.4	97.2	78.1	83.3
7. 3M Demonstration of Audio Visual Equipment	76.8	75.0	86.1	71.9	72.9
8. K & E Demonstration of Audio Visual Equipment	79.4	80.4	88.9	71.9	77.1
9. Transparency Preparation and Use.	83.0	89.4	86.1	78.6	83.3
10. Demonstration by Students	76.8	78.6	77.8	75.0	77.1
11. Projection Equipment and Models	67.5	66.1	69.5	63.9	68.7
12. 3 Dimensional Demonstrations	68.1	69.6	72.2	59.4	70.8
13. Charts and Posters.	64.3	71.5	68.8	62.5	62.5
14. Practical Exercises	65.5	69.6	63.9	56.3	72.9
15. Use of Pass Out Material.	68.1	73.2	75.0	68.8	62.5
16. Related Handout Material.	66.4	73.2	66.7	68.8	64.6
General Acceptance	73.4	76.5	75.9	71.1	72.8

SCALE:
87.5 - 100 , VERY WORTHWHILE
62.5 - 87.4, WORTHWHILE
37.5 - 62.4, MODERATELY WORTHWHILE
12.5 - 37.4, OF LITTLE VALUE
0 - 12.4, OF NO VALUE

TABLE IV

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR A PERSONAL BROADENING EXPERIENCE IN AUDIO-VISUAL MATERIALS AND METHODS FOR SHOP AND RELATED SUBJECTS, INDUSTRIAL EDUCATION, 3320, 3330

TOPICS		Composite of All Groups	Participants Who Repeated Class	Machinist	Electronics	Drafting
	Responses in each Category	30	14	9	9	12
1.	Graded Notebook required for future reference	62.5	66.1	66.7	72.2	52.1
2.	Theory and purpose of Audio Visual.	75.0	78.6	69.5	80.5	75.0
3.	Use of the various instructional aids	78.3	85.7	80.6	80.5	75.0
4.	Characteristics of a good Visual Aid	74.2	78.6	66.7	77.8	77.1
5.	Classification of Aids.	70.9	73.2	58.3	75.0	77.1
6.	Overhead Projecter.	81.7	84.0	94.4	75.0	77.1
7.	3M Demonstration of Audio Visual Equipment.	77.5	75.0	86.1	72.2	75.0
8.	K & E Demonstration of Audio Visual Equipment	80.9	80.4	88.9	72.2	81.2
9.	Transparency Preparation and Use.	81.9	89.4	83.3	81.3	81.2
10.	Demonstration by Students	73.4	75.0	75.0	77.8	68.7
11.	Projection Equipment and Models	70.0	69.6	72.2	66.7	70.8
12.	3 Dimensional Demonstration	65.8	69.6	69.5	63.9	64.6
13.	Charts and Posters.	65.5	69.6	59.4	66.7	68.7
14.	Practical Exercises	62.5	66.1	55.5	58.4	70.8
15.	Use of Pass Out Material.	72.5	76.8	75.0	69.5	72.9
16.	Related Handout Material.	67.5	76.8	63.9	66.7	70.8
	GENERAL ACCEPTANCE	72.5	76.0	72.9	72.2	72.3

SCALE:	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 87.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 37.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

METHODS OF TEACHING SHOP AND RELATED SUBJECTS

INDUSTRIAL EDUCATION 4210

Four of the 12 members of this class of 19, who returned questionnaires, had taken a similar class before in a college or university. Their responses have been computed separately to see if repeating the class had any effect on the "worthwhileness" of the class.

By assigning numerical values to the responses and then computing the averages it was found that the total class response did not indicate any topic in the "very worthwhile" category. However, except for one item all the composite responses fell into the "worthwhile" category with distinct variations between the subject areas, as shown in Tables V and VI.

The participants who repeated the course rated the "visual aids" topic (Item 10) as "very worthwhile". The topic that had the least value to those who repeated the course was "how to instruct" (Item 5). None of the responses fell below "moderately worthwhile".

The electronics group rated most topics in the methods class as "very worthwhile" in contrast to other sections. The machinist and draftsmen teachers, who felt most topics were only "moderately worthwhile", indicated the "visual aids" topic as being of more value as shown in Tables V and VI. Participants, who repeated the class, indicated the value was greater as a "personal broadening experience" than as a teaching aid. Other participants felt the value to the teaching situation was greater.

TABLE V

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING SITUATION IN METHODS OF TEACHING SHOP AND RELATED SUBJECTS INDUSTRIAL EDUCATION 4210

TOPICS	Composite of All Groups	Participants Who Repeated Class	Machirist	Electronics	Drafting
Responses in each Category	12	4	3	5	4
1. Teaching and Learning	79.2	62.5	50.0	95.0	81.3
2. Methods of Teaching	75.0	56.2	50.0	90.0	75.0
3. Subject and Content	66.7	50.0	41.7	85.0	62.5
4. Planning to Teach	77.1	62.5	50.0	95.0	75.0
5. How to Instruct	68.8	43.7	41.7	95.0	56.2
6. Presenting a Lesson	68.8	50.0	50.0	95.0	50.0
7. Methods for Presenting Information	77.1	75.0	50.0	90.0	81.3
8. Questioning Techniques	79.2	75.0	58.3	90.0	81.3
9. Lesson Plans and Lesson Planning	77.1	75.0	58.3	90.0	75.0
10. Visual Aids	83.3	93.7	83.3	85.0	81.3
11. Student Teaching	72.9	56.2	75.0	90.0	50.0
12. Use of Pass Out Material	79.2	68.7	83.3	90.0	62.5
13. Related Handout Material	79.5	68.7	83.3	93.8	62.5
General Acceptance	75.6	64.4	59.5	91.0	68.7

SCALE:		
	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 87.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 37.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

TABLE VI

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR A PERSONAL BROADENING EXPERIENCE IN METHODS OF TEACHING SHOP AND RELATED SUBJECTS INDUSTRIAL EDUCATION 4210

TOPICS	Composite of All Groups	Participants who Repeated Class	Machinist	Electronics	Drafting
Responses in each Category	12	4	3	5	4
1. Teaching and Learning	75.0	68.7	41.7	93.8	81.3
2. Methods of Teaching	75.0	68.7	50.0	93.8	75.0
3. Subject and Content	68.2	62.5	50.0	87.5	62.5
4. Planning to Teach	75.0	68.7	58.3	93.8	68.8
5. How to Instruct	61.4	50.0	50.0	87.5	43.8
6. Presenting a Lesson	63.6	56.2	58.3	93.8	37.5
7. Methods for Presenting Information	70.4	75.0	50.0	87.5	68.8
8. Questioning Technique	70.4	75.0	58.3	81.3	68.8
9. Lesson Plans and Lesson Planning	68.2	68.7	58.3	87.5	56.2
10. Visual Aids	77.2	93.7	91.7	81.3	62.5
11. Student Teaching	65.9	56.2	58.3	93.8	43.8
12. Use of Pass Out Material	75.0	75.0	75.0	93.8	56.2
13. Related Handout Material	77.2	75.0	75.0	93.8	62.5
General Acceptance	71.0	68.6	59.5	89.9	60.5

SCALE:		
	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 87.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 37.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

CURRICULUM BUILDING IN TRADE AND INDUSTRIAL SUBJECTS, INDUSTRIAL EDUCATION 4310, 4320

Four of the 20 members of this class of 26, who returned questionnaires, had taken a similar class before in a college or university. Their responses have been computed separately to see if repeating the class had any effect on the "worthwhileness" of the class.

By assigning numerical values to the responses and then computing the averages it was found that the total class response did not indicate any topic in the "very worthwhile" category. However, all the composite responses fell into the "worthwhile" category with distinct variations between the subject areas, as shown in the Tables VII and VIII.

Participants who repeated this class rated it higher than either the electronics or drafting group participants did. This class was rated significantly higher by machinist teachers as they indicated all "worthwhile" and "very worthwhile" ratings. Topics were consistently rated below the machinist rating by the drafting and electronics in-service teachers who indicated most of the responses in the "moderately worthwhile" and "worthwhile" categories.

No one topic stood out as being significantly of more or less value than the others. The responses were unusually uniform in each group.

TABLE VII

AVERAGES ON A *SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING SITUATION IN CURRICULUM BUILDING IN TRADE AND INDUSTRIAL SUBJECTS, INDUSTRIAL EDUCATION 4310, 4320

TOPICS	Composite of All Groups	Participants Who Repeated Class	Machinist	Electronics	Drafting
Responses in each Category	20	4	10	6	4
1. Source of Instructional Material	77.5	75.0	87.5	70.8	62.5
2. Examples of Instruction Sheets	73.8	75.0	85.0	62.5	62.5
3. The Lesson Plan.	72.5	75.0	82.5	70.8	50.0
4. Preparation of Lessons	75.0	75.0	87.5	70.8	50.0
5. Use of Handout Material	75.0	83.3	82.5	75.0	56.3
General Acceptance	74.6	76.6	85.0	70.0	56.2

TABLE VIII

AVERAGES ON A *SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR A PERSONAL BROADENING EXPERIENCE IN CURRICULUM BUILDING IN TRADE AND INDUSTRIAL SUBJECTS, INDUSTRIAL EDUCATION 4310, 4320

TOPICS	Composite of All Groups	Participants Who Repeated Class	Machinist	Electronics	Drafting
Responses in each Category	20	4	10	6	4
1. Sources of Instructional Material	72.5	75.0	87.5	58.3	56.3
2. Examples of Instruction Sheets.	67.5	75.0	80.0	58.3	50.0
3. The Lesson Plan	68.7	75.0	82.5	58.3	50.0
4. Preparation of Lessons.	71.2	75.0	85.0	62.5	50.0
5. Use of Handout Material	66.2	75.0	80.0	58.3	43.8
General Acceptance	69.2	75.0	83.0	59.1	50.0

* SCALE: 87.5 - 100 , VERY WORTHWHILE
62.5 - 87.4, WORTHWHILE
37.5 - 62.4, MODERATELY WORTHWHILE
12.5 - 37.4, OF LITTLE VALUE
0 - 12.4, OF NO VALUE

CONFERENCE LEADERSHIP, INDUSTRIAL EDUCATION 4410

Four of the 16 members of this class of 20, who returned questionnaires, had taken a similar class before in a college or university. Their responses have been computed separately to see if repeating the class had any effect on the "worthwhileness" of the class.

By assigning numerical values to the responses it was found that the total class response was favorable in that all but one item fell in the "worthwhile" and "very worthwhile" categories. The most valuable topics were: conference leading techniques and procedures and student conferences as shown in the Tables IX and X.

The topics of this class were rated higher by the electronics and drafting teachers than by the machinists. The drafting area instructors felt the handout materials were of much more value than did the other groups. Another interesting difference is the electronics teachers rated the conference leading text as "very worthwhile" when the other groups rated it about "moderately worthwhile". The topic considered the least rewarding but "moderately worthwhile" to "worthwhile" was the evaluation of student conferences.

Those who were repeating the class rated the class as less rewarding than the groups as a whole. They especially felt the "use of the conference leading text" was only moderately worthwhile in relation to their teaching situation.

TABLE IX

AVERAGES ON A *SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING SITUATION IN CONFERENCE LEADERSHIP INDUSTRIAL EDUCATION 4410

TOPICS		Composite of All Groups	Participants Who Repeated Class	Machinist	Electronics	Drafting
	Responses in Each Category	16	4	6	6	4
1.	Conference Leading Techniques and Procedures . .	89.1	68.8	79.2	100	87.5
2.	Student Conferences.	84.4	75.0	79.2	87.5	87.5
3.	Evaluation of Student Conferences.	64.1	62.5	50.0	66.7	81.3
4.	Use of Conference Leading Text	70.0	50.0	62.5	87.5	50.0
5.	Use of Handout Material.	70.4	62.5	58.4	75.0	81.3
	General Acceptance	75.6	63.8	65.8	83.3	77.4

TABLE X

AVERAGES ON A *SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR A PERSONAL BROADENING EXPERIENCE IN CONFERENCE LEADERSHIP, INDUSTRIAL EDUCATION 4410

TOPICS		Composite of All Groups	Participants Who Repeated Class	Machinist	Electronics	Drafting
	Responses in Each Category	16	4	6	6	4
1.	Conference Leading Techniques and Procedures . .	92.2	81.3	83.3	100	93.8
2.	Student Conferences.	86.0	81.3	83.3	87.5	87.5
3.	Evaluation of Student Conferences.	61.6	50.0	54.2	66.7	66.7
4.	Use of Conference Leading Text	73.3	62.5	62.5	87.5	66.7
5.	Use of Handout Material.	73.5	75.0	58.4	75.0	93.8
	General Acceptance	77.3	70.0	68.2	83.3	81.7

*SCALE:		
	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 87.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 36.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

SECTION III

INDUSTRIAL TECHNOLOGY RESPONSES

The class average on every topic had a "worthwhile" or "very worthwhile" rating in the three subject areas. Of the 90 averaged responses, 55 were in the "very worthwhile" category and 35 were in the "worthwhile" category.

The averages of the 17 respondents out of a possible 20 in Machine Shop and Fabrication indicated 20 "very worthwhile" and 12 "worthwhile" evaluations as shown in Table I. Apparently the topics selected for the machinists were meaningful to the participants. However, the indications were somewhat higher for the personal broadening experience than of value for their teaching situation.

TABLE I

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING AND FOR A PERSONAL BROADENING EXPERIENCE IN MACHINE SHOP AND FABRICATION

TOPICS	For Immediate or Foreseeable Teaching Situation	For a Personal Broadening Experienc
NUMBER OF RESPONSES	17	17
1. Shop Safety	97.1	91.2
2. Job Processing and work management	85.3	83.8
3. Value Engineering	69.1	80.9
4. Machine Tool Maintenance	92.6	91.2
5. Hydraulic System	83.8	88.2
6. Welding (History through technology)	77.9	91.2
7. Metallurgy		
a. Materials and properties	95.6	97.1
b. Casting, pressing and sintering	89.7	94.1
c. Non-Destructive Testing	92.6	95.6
d. Rolling, forming and forging	90.6	89.7
8. Measurement		
a. History	91.7	91.7
b. Inspection Equipment	85.9	93.8
c. Quality Assurance	76.6	85.9
9. Numerical Control Machines With Machine Tool Applications	83.8	95.6
10. True Position Dimensioning	79.4	96.9
11. Air Bearings	82.4	97.1
GENERAL ACCEPTANCE	85.3	91

SCALE:		
87.5 - 100	VERY WORTHWHILE
62.5 - 87.4	WORTHWHILE
37.5 - 62.4	MODERATELY WORTHWHILE
12.5 - 37.4	OF LITTLE VALUE
0 - 12.4	OF NO VALUE

The averages of the 15 respondents out of a possible 20 in Mechanical Technology and Drafting indicated 13 "very worthwhile" and 19 "worthwhile" evaluations as shown in Table II. Regarding specific value for their teaching situation, 3 of the 16 items fell in the "very worthwhile" category to 13 in the "worthwhile" category. However, the broadening experience to the drafting participants rated an average 8.6 points higher as shown in Table II.

TABLE II

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING AND FOR A PERSONAL BROADENING EXPERIENCE IN MECHANICAL TECHNOLOGY AND DRAFTING

TOPICS		For Immediate or Foreseeable Teaching Situation	For a Personal Broadening Experience
	NUMBER OF RESPONSES	15	15
1.	Drafting Laboratory	85.7	87.5
2.	Observation of Shop Practices	93.3	95
3.	True Position Dimensioning	93.3	96.7
4.	Value Engineering	86.7	95
5.	Welding, History, Current Practices and Technology	75	86.7
6.	Radiography, Radiation and Applications Of	76.7	86.7
7.	Nondestructive Testing--Ultrasonics, Eddy Current, Magnetic Induction, Beta Back Scatter Gaging, Radiation Absorption Gaging, Micro Wave, and Thermal Testing	78.6	87.5
8.	Metallurgical and Mechanical Testing	76.7	86.7
9.	Penetrant Testing	71.7	81.7
10.	Pressure Testing	70	80
11.	Estimating From Drawings, Practice	85	90
12.	Shop Fabrication Use of Drawings	91.7	95
13.	Y-12 Engineering Standards	73.3	85
14.	Critical Path Scheduling	73.3	88.3
15.	Reproduction Techniques--Microfilm	81.7	96.7
16.	APT (Automatic Program Tools) Numerical Control	81.7	91.7
	GENERAL ACCEPTANCE	80.4	89

SCALE:	87.5 - 100	VERY WORTHWHILE
	62.5 - 87.4	WORTHWHILE
	37.5 - 62.4	MODERATELY WORTHWHILE
	12.5 - 37.4	OF LITTLE VALUE
	0 - 12.4	OF NO VALUE

The averages of the 14 respondents out of a possible 20 in Industrial Electronics and Maintenance indicated 22 "very worthwhile" and 3 "worthwhile" evaluations as shown in Table III.

The respondents indicated the topics were well selected to aid them both in their teaching situation and personal growth.

TABLE III

AVERAGES ON A SCALE OF 0-100 OF RELATIVE WORTH OF TOPICS FOR THE IMMEDIATE OR FORESEEABLE TEACHING AND FOR A PERSONAL BROADENING EXPERIENCE IN INDUSTRIAL ELECTRONICS AND MAINTENANCE

TOPICS	For Immediate or Foreseeable Teaching Situation	For a Personal Broadening Experience
NUMBER OF RESPONSES	14	14
1. Remote Communication	82.1	85.7
2. Radiation instruments	85.7	92.9
3. Electrical and pneumatic industrial instruments	87.5	98.2
4. High Vacua	87.5	94.6
5. Transducers	89.3	96.4
6. Printed Circuits	94.6	98.2
7. Position Control and Tracer Control	85.7	94.6
8. Computer: Gate, logic, memory, math, etc.	96.4	98.2
9. Numerical Control Trainer	87.5	96.4
10. Calibration: Physical and electrical standards	87.5	94.6
11. Microelectronics and integrated circuits	98.2	98.2
12. Laser Technology	91.1	98.2
13. X-ray Technology	87.5	94.6
GENERAL ACCEPTANCE	88.8	95

SCALE:	87.5 - 100	VERY WORTHWHILE
	62.5 - 87.4	WORTHWHILE
	37.5 - 62.4	MODERATELY WORTHWHILE
	12.5 - 37.4	OF LITTLE VALUE
	0 - 12.4	OF NO VALUE

SECTION IV

SEMINAR RESPONSES

General acceptance of the seminars by all groups was considered "worthwhile" although the participants felt they were usually more valuable as a personal broadening experience than as an aid to their teaching situation. On a scale of 0-100 (of no value to very worthwhile) overall personal experience value averaged in the 80 range while value for their teaching situation averaged in the 70 range.

Tables I and II show averages by groups of in-service teachers and a composite of all groups as to the relative value of seminars to their teaching situation and to a personal broadening experience. Table III provides a quick reference as to the acceptance of each seminar by groups of teachers. The value of topics varied between teaching areas although no seminar rated below "moderately worthwhile" for any group.

Seminars receiving the highest overall value rating were "Necessity of standards and their relationships to industry" and "Applications of numerical control to Machining". Topics receiving the lowest overall value rating were "Design and construction of semi-and ultra-clean rooms for fabrication use" and "Bull Run Steam Plant tour".

The general conclusion is that the seminars, as conducted, were a personally broadening experience and generally contributed to the participants teaching situation. Improvement can be made by scheduling seminars more precisely for groups in relation to their needs and interests.

TABLE I

AVERAGES OF IN-SERVICE TEACHER COMPOSITE AND GROUP RATINGS, ON A SCALE OF 0-100, OF SEMINAR TOPICS, AS TO THE RELATIVE WORTH OF THE TOPICS TO THEIR TEACHING SITUATIONS

TOPICS	Composite of All Groups	Machinist	Electronics	Drafting
Responses in Each Category	47	17	15	15
1. Necessity of standards and their relationships to industry	89.1	92.7	82.1	91.7
2. Application of small computers to process control	77.8	75.0	85.7	73.3
3. Oak Ridge National Laboratory Demonstration Tour	75.6	78.1	80.4	67.9
4. Optical Applications in Dimensional Gaging	73.9	82.8	71.7	66.7
5. Design and Construction of Semi- and ultra-clean rooms for fabrication use	64.7	76.6	60.0	56.7
6. Position Monitoring Device	68.5	73.4	71.7	60.0
7. Visual Aids Presentation	85.0	89.8	60.0	82.7
8. Fabrication of Miniaturized Hardware for Space Equipment	70.5	71.9	84.6	56.7
9. Non-Destructive Testing of Engineering Materials	84.4	90.6	71.4	90.0
10. Modern Methods of Machine Tool Evaluation	81.8	91.2	64.3	76.7
11. Effects of Temperature on Precision of Machine Tool	85.0	98.5	65.4	86.7
12. Application of Hydrostatic Lubrication of Machine Tool Components	69.6	78.0	58.9	70.0
13. Electronic Instrument Engineering	80.4	66.2	91.1	86.7
14. New Developments in Close Tolerance Machining	83.9	95.3	66.1	88.3
15. Applications of Numerical Control to Machining	89.4	95.3	82.1	90.0
16. Problem Areas in Fabrication	73.4	76.5	60.7	81.7
17. Maintenance Requirements for Numerical Control	75.5	78.0	84.0	65.0
18. Numerically Controlled Gaging Machines	75.5	75.0	80.4	71.7
19. Programming for Numerically Controlled Machine Tools	82.0	80.9	80.4	85.0
20. Programming	81.0	77.9	82.1	83.3
21. Problem Areas in Quality Control	67.4	71.0	60.7	70.0
22. Orientation Electronic Data Processing Systems	68.3	61.8	85.7	58.9
23. Computer Demonstration Tour	72.8	67.6	84.0	67.9
24. Critical Path Scheduling	70.1	67.6	60.7	81.7
25. Reproduction and Engineering Documentation	71.2	61.8	60.7	91.7
26. Bull Run Steam Plant Tour	64.2	72.0	61.5	57.1
27. The Role of Metallurgy in the fabrication of very large parts	72.8	82.4	57.1	76.7
28. Industrial Interferometry	73.9	79.4	84.0	58.3
29. Length Measuring Laser Interferometer	76.1	80.9	89.3	58.3
30. Practical Developments in Precision Machining	79.9	92.6	67.9	76.7
31. Automatic Tool Positions	80.0	79.7	78.6	81.7
General Acceptance	72.3	78.9	72.9	74.0

SCALE:	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 84.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 37.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

TABLE II

AVERAGES OF IN-SERVICE TEACHER COMPOSITE AND GROUP RATINGS, ON A SCALE OF 0-100, OF SEMINAR TOPICS, AS TO THE RELATIVE WORTH OF TOPICS TO A PERSONAL BROADENING EXPERIENCE

TOPICS	Composite of All Groups	Machinist	Electronics	Drafting
Responses in Each Category	47	17	15	15
1. Necessity of standards and their relationships to industry.	87.8	92.2	92.9	90.0
2. Application of small computers to process control	86.2	86.8	87.5	90.0
3. Oak Ridge National Laboratory Demonstration Tour	82.4	86.7	91.1	86.7
4. Optical Applications in Dimensional Gaging	84.0	88.3	83.9	85.0
5. Design and Construction of Semi- and ultra-clean rooms for fabrication use	78.2	83.8	76.8	78.3
6. Position Monitoring Device.	78.7	82.4	86.5	78.3
7. Visual Aids Presentation	78.2	85.4	83.3	75.0
8. Fabrication of Miniaturized Hardware for Space Equipment. .	81.4	82.4	85.7	81.7
9. Non-Destructive Testing of Engineering Materials.	88.8	92.7	60.0	91.7
10. Modern Methods of Machine Tool Evaluation	89.4	95.6	60.0	90.0
11. Effects of Temperature on Precision of Machine Tool	91.0	98.5	91.1	88.3
12. Application of Hydrostatic Lubrication of Machine Tool Components.	84.0	88.3	60.0	81.7
13. Electronic Instrument Engineering	83.5	76.5	93.3	81.7
14. New Developments in Close Tolerance Machining	90.4	97.1	60.0	91.7
15. Applications of Numerical Control to Machining.	93.1	95.6	88.3	95.0
16. Problem Areas in Fabrication.	79.3	79.4	76.7	81.7
17. Maintenance Requirements for Numerical Control	83.5	83.8	86.7	80.0
18. Numerically Controlled Gaging Machines.	86.7	89.8	85.0	85.0
19. Programming for Numerically Controlled Machine Tools. . . .	90.4	95.6	89.3	91.7
20. Programming	88.3	89.7	92.9	88.3
21. Problem Areas in Quality Control.	76.6	70.6	85.7	80.0
22. Orientation Electronic Data Processing Systems.	80.9	79.4	94.7	75.0
23. Computer Demonstration Tour	86.2	88.2	94.7	81.7
24. Critical Path Scheduling.	81.4	76.5	80.4	93.3
25. Reproduction and Engineering Documentation.	81.9	73.5	85.7	93.3
26. Bull Run Steam Plant Tour	79.0	85.3	78.6	75.0
27. The Role of Metallurgy in the fabrication of very large parts	84.6	94.1	80.4	83.3
28. Industrial Interferometry	87.2	94.1	91.1	81.7
29. Length Measuring Laser Interferometer	90.4	94.1	96.4	86.7
30. Practical Developments in Precision Machining	89.4	97.1	85.7	70.0
31. Automatic Tool Positions.	88.3	91.2	89.3	70.0
General Acceptance	80.6	89.7	83.2	83.6

SCALE:		
	87.5 - 100 ,	VERY WORTHWHILE
	62.5 - 84.4,	WORTHWHILE
	37.5 - 62.4,	MODERATELY WORTHWHILE
	12.5 - 37.4,	OF LITTLE VALUE
	0 - 12.4,	OF NO VALUE

TABLE III

IN-SERVICE TEACHER GROUP RATINGS OF SEMINAR TOPICS AS TO THE RELATIVE WORTH OF SEMINARS TO THEIR TEACHING SITUATION AND FOR A PERSONAL BROADENING EXPERIENCE

SEMINAR TOPICS	MACHINIST		ELECTRONICS		DRAFTING	
	TEACHING VALUE	PERSONAL VALUE	TEACHING VALUE	PERSONAL VALUE	TEACHING VALUE	PERSONAL VALUE
1. Necessity of standards and their relationships to industry	1	1	2	1	1	1
2. Application of small computers to process control	2	2	2	1	2	2
3. Oak Ridge National Laboratory Demonstration Tour	2	2	2	1	2	2
4. Optical Applications in Dimensional Gaging	2	2	2	2	2	2
5. Design and Construction of Semi- and ultra-clean rooms for fabrication use	2	2	3	2	3	2
6. Position Monitoring Device	2	2		2	3	2
7. Visual Aids Presentation	1	2	3	2	2	2
8. Fabrication of Miniaturized Hardware for Space Equipment	2	2	2	2	3	2
9. Non-Destructive Testing of Engineering Materials	1	1	2	3	2	1
10. Modern Methods of Machine Tool Evaluation	1	1	2	3	2	1
11. Effects of Temperature on Precision of Machine Tool	1	1	2	1	2	1
12. Application of Hydrostatic Lubrication of Machine Tool Components	2	1	3	3	2	2
13. Electronic Instrument Engineering	2	2	1	1	2	2
14. New Developments in Close Tolerance Machining	1	1	2	3		1
15. Applications of Numerical Control to Machining	1	1	2	1	1	1
16. Problem Areas in Fabrication	2	2	3	2	2	2
17. Maintenance Requirements for Numerical Control	2	2	2	2	2	2
18. Numerically Controlled Gaging Machines	2	1	2	2	2	2
19. Programming for Numerically Controlled Machine Tools	2	1	2	1	2	1
20. Programming	2	1	2	1	2	1
21. Problem Areas in Quality Control	2	2	3	2	2	2
22. Orientation Electronic Data Processing Systems	3	2	2	1	2	2
23. Computer Demonstration Tour	2	1	2	1	2	2
24. Critical Path Scheduling	2	2	3	2	2	1
25. Reproduction and Engineering Documentation	3	2	3	2	1	1
26. Bull Run Steam Plant Tour	2	2	3	2	3	2
27. The Role of Metallurgy in the fabrication of very large parts	2	1	3	2	2	2
28. Industrial Interferometry	2	1	2	1	3	2
29. Length Measuring Laser Inferometer	2	1	1	1	3	2
30. Practical Developments in Precision Machining	1	1	2	2	2	2
31. Automatic Tool Positions	2	1	2	1	2	2

SCALE:
1, VERY WORTHWHILE
2, WORTHWHILE
3, MODERATELY WORTHWHILE
4, OF LITTLE VALUE
5, OF NO VALUE

APPENDIX

Questionnaire Forms and Covering Letter

TRAINING AND TECHNOLOGY
P. O. BOX 117 ● OAK RIDGE, TENNESSEE ● 37830

Oak Ridge Associated Universities
University of Tennessee
Union Carbide Corporation Nuclear Division
Conducted at the Oak Ridge Y-12 Plant

Five months have passed since the close of the 1966 In-Service Teacher Institute, and we are busily working on the 1967 schedule. Your reactions to the Institute will contribute to the evaluation of the 1966 institute and to changes in the program for 1967.

On September 9 an evaluation panel, made up of leaders of vocational education, reviewed the summer institute. Three summer participants; Paul M. Starnes, Curtis Hixon, and E. H. Adams attended these meetings and presented their reactions.

Don Vernine visited some participants in December and obtained some valuable information about how teachers are relating their summer experiences to teaching. His findings indicated a need for an evaluative response from all participants on details of the institute. In an effort to get a measure of effectiveness of the program, we would like you to respond to the questionnaires enclosed. The topics of classes and seminars are listed separately in order that responses can be made on the relative value of many items.

We hope you like the picture enclosed. May the new year be especially rewarding to you.

Sincerely yours,

John C. Hamel, Coordinator
Experimentation and Training

JCH:rp

Enclosure

TRAINING
AND
TECHNOLOGY

Oak Ridge Associated Universities
Union Carbide Corporation
University of Tennessee

NAME________________________________

Which (if any) of the following industrial education courses had you completed before the summer institute?

☐ Conference Leadership

☐ Shop Organization and Management

☐ Audio-Visual Materials and Methods

☐ Curriculum Building in Trade and Industrial Subjects

☐ Methods of Teaching Shop and Related Subjects

JCH:rp
1/18/67

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

General Information

INSTRUCTIONS

The items mentioned are related to the summer 1966 In-Service Teacher Institute Program. Please note your evaluation of each statement by placing a __V__ on the continuum.

	MEANINGFUL SUMMER INSTITUTE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. The concept of providing in-service teacher training in an industrial setting is					
2. The orientations sessions (to Oak Ridge, the plant and area) were					
3. Time devoted to college credit mathematics classes would be					
4. Time devoted to college credit English classes would be					
5. Time devoted to college credit science and technology classes would be					
6. The pre-institute information concerning the program was					
7. The testing sessions and the return of test results were					
8. The individual and group counseling sessions were					

Please comment on any segment of the program. Your ideas will be helpful in planning the summer program for 1967.

What courses have you been teaching since attending the institute?

Have you used information or ideas from the institute in your teaching or developing your career? Yes___, No______. Could you give an example?______

____

____

Can you suggest a topic for a technical paper that would be of help to you?______________________

____

ORAU
JCH:rp
1/10/67

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Shop Organization and Management
Industrial Education 3310

INSTRUCTION

The items mentioned are those that were presented in the Industrial Education 3310 Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a __V__ on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATE-LY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Notebook required and graded										
2. Characteristics of a good shop teacher										
3. Qualities and work habits of a good vocational-technical teacher .										
4. Competencies needed by a trade teacher										
5. Comparison of a school shop to a commerical shop										
6. Visual aids used in shop teaching										
7. Visual Aid Demonstration by 3M										
8. Shop organization and management procedures										
9. Visual Aid Demonstration by K & E										
10. Planning a shop--shop planning packet										
11. Student prepared shop layout of their shop										
12. Oral reports over shop related subjects										
13. Extensive class discussion concerning common shop teaching problems										
14. Shared Management Procedures										
15. Safe Practices										
16. Related Handout Material										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Audio-Visual Materials and Methods for Shop and Related Subjects
Industrial Education 3320, 3330

INSTRUCTIONS

The items mentioned are those that were presented in the Industrial Education 3320, 3330 Section. Please respond on the two continua, noting _your_ evaluation as to the relative worth to _both_ your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a __V__ on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Graded Notebook required for future reference										
2. Theory and purpose of Audio Visual										
3. Use of the various instructional aids										
4. Characteristics of a good Visual Aid										
5. Classification of Aids										
6. Overhead Projecter										
7. 3 M Demonstration of Audio Visual Equipment										
8. K & E Demonstration of Audio Visual Equipment										
9. Transparency Preparation and Use										
10. Demonstration by Students										
11. Projection Equipment and Models										
12. 3 Dimensional Demonstrations										
13. Charts and Posters										
14. Practical Exercises										
15. Use of Pass Out Material										
16. Related Handout Material										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Methods of Teaching Shop and Related Subjects
Industrial Education 4210

INSTRUCTION

The items mentioned are those that were presented in the Industrial Education 4210 Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a __V__ on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Teaching and Learning										
2. Methods of Teaching										
3. Subject and Content										
4. Planning to Teach										
5. How to Instruct										
6. Presenting a Lesson										
7. Methods for Presenting Information										
8. Questioning Technique										
9. Lesson Plans and Lesson Planning										
10. Visual Aids										
11. Student Teaching										
12. Use of Pass Out Material										
13. Related Handout Material										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Curriculum Building in Trade and Industrial Subjects
Industrial Education 4310,4320

INSTRUCTIONS

The items mentioned are those that were presented in the Industrial Education 4310, 4320 Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a V on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Sources of Instructional Material										
2. Examples of Instruction Sheets										
3. The Lesson Plan										
4. Preparation of Lessons										
5. Use of Handout Material										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Conference Leadership, Industrial Education, 4110

INSTRUCTIONS

The items mentioned are those that were presented in the Industrial Education, 4110 Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a __V__ on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Conference Leading Techniques and Procedures										
2. Student Conferences										
3. Evaluation of Student Conferences										
4. Use of Conference Leading Text										
5. Use of Handout Material										

TRAINING AND TECHNOLOGY
1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE
Machine Shop and Fabrication

INSTRUCTIONS

The items mentioned are those that were presented in the Machine Shop and Fabrication Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a ✓ on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Shop Safety										
2. Job Processing and work management										
3. Value Engineering										
4. Machine Tool Maintenance										
5. Hydraulic System										
6. Welding (History through technology)										
7. Metallurgy										
a. Materials and properties										
b. Casting, pressing and sintering										
c. Non-Destructive Testing										
d. Rolling, forming and forging										
8. Measurement										
a. History										
b. Inspection Equipment										
c. Quality Assurance										
9. Numerical Control Machines With Machine Tool Applications										
10. True Position Dimensioning										
11. Air Bearings										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Mechanical Technology and Drafting

INSTRUCTIONS

The items mentioned are those that were presented in the Mechanical Technology and Drafting Section. Please respond on the two continua, noting *your* evaluation as to the relative worth to *both* your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a ✓ on each continuum.

SESSIONS	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Drafting Laboratory										
2. Observation of Shop Practices										
3. True Position Dimensioning										
4. Value Engineering										
5. Welding, History, Current Practices and Technology										
6. Radiography, Radiation and Applications Of										
7. Nondestructive Testing--Ultrasonics, Eddy Current, Magnetic Induction, Beta Back Scatter Gaging, Radiation Absorption Gaging, Micro Wave, and Thermal Testing										
8. Metallurgical and Mechanical Testing										
9. Penetrant Testing										
10. Pressure Testing										
11. Estimating From Drawings, Practice										
12. Shop Fabrication Use of Drawings										
13. Y-12 Engineering Standards										
14. Critical Path Scheduling										
15. Reproduction Techniques--Microfilm										
16. APT (Automatic Program Tools) Numerical Control										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Industrial Electronics Technology and Maintenance

INSTRUCTIONS

The items mentioned are those that were presented in the Industrial Electronics Technology and Maintenance Section. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a V on each continuum.

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Remote Communication										
2. Radiation instruments										
3. Electrical and pneumatic industrial instruments										
4. High Vacua										
5. Transducers										
6. Printed Circuits										
7. Position Control and Tracer Control										
8. Computer: Gate, logic, memory, math, etc.										
9. Numerical Control Trainer										
10. Calibration: Physical and electrical standards										
11. Microelectronics and integrated circuits										
12. Laser Technology										
13. X-ray Technology										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Seminars

INSTRUCTIONS

The items mentioned are those that were presented in the Seminars. Please respond on the two continua, noting your evaluation as to the relative worth to both your immediate or foreseeable teaching, and to your personal broadening experiences. Note your evaluation by placing a __V__ on each continuum.

TOPICS COVERED	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
1. Necessity of standards and their relationships to industry										
2. Application of small computers to process control										
3. Oak Ridge National Laboratory Demonstration Tour										
4. Optical Applications in Dimensional Gaging										
5. Design and Construction of Semi-and ultra-clean rooms for fabrication use										
6. Position Monitoring Devise										
7. Visual Aids Presentation										
8. Fabrication of Miniaturized Hardware for Space Equipment										
9. Non-Destructive Testing of Engineering Materials										
10. Modern Methods of Machine Tool Evaluation										
11. Effects of Temperature on Precision of Machine Tool										
12. Application of Hydrostatic Lubrication of Machine Tool Components.										
13. Electronic Instrument Engineering										
14. New Developments in Close Tolerance Machining										
15. Applications of Numerical Control to Machining										
16. Problem Areas in Fabrication										
17. Maintenance Requirements for Numerical Control										
18. Numerically Controlled Gaging Machines										

TRAINING AND TECHNOLOGY

1966 SUMMER IN-SERVICE INSTITUTE FOLLOW-UP QUESTIONNAIRE

Seminars

Seminars Continued

	IMMEDIATE OR FORESEEABLE TEACHING SITUATION					PERSONAL BROADENING EXPERIENCE				
	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
19. Programming for Numerically Controlled Machine Tools										
20. Programming										
21. Problem Areas in Quality Control										
22. Orientation Electronic Data Processing Systems										
23. Computer Demonstration Tour										
24. Critical Path Scheduling										
25. Reproduction and Engineering Documentation										
26. Bull Run Steam Plant Tour										
27. The Role of Metallurgy in the Fabrication of very large parts . .										
28. Industrial Interferometry										
29. Length Measuring Laser Interferometer										
30. Practical Developments in Precision Machining										
31. Automatic Tool Positions										

Follow-up Field Visits

1966 In-Service Institute

PREFACE

This report on follow-up field visits to 18 participants in the Training and Technology Project's 1966 In-Service Vocational-Technical Teacher Institute was prepared by Donald J. Vernine, a member of the project staff. Participants in five states--Tennessee, Georgia, South Carolina, North Carolina and Virginia--were visited on the tour made during the week of December 5, 1966. Information gathered on the tour was used as the basis for a questionnaire sent to all participants of the institute. The results of this questionnaire are included in a separate report, "1966 In-Service Institute Follow-Up Questionnaire" (FD-27).

Materials received on the visits to participants and listed in an appendix to this report are in the Project Information Office exhibit file on "Follow-Up Field Visits, 1966 In-Service Institute."

TRAINING
AND
TECHNOLOGY

Oak Ridge Associated Universities
Union Carbide Corporation
University of Tennessee

IN-SERVICE FIELD VISIT REPORT

During the week of December 5, 1966, visits were made to the schools of 19 participants as a first step in the scheduled follow-up activity of our first summer in-service institute. Mr. Blanton of Gaffney, South Carolina, was not available which reduced the number of interviews to 18.

This was a multi-purpose visit designed to do the following: Observe the participants in their home environment, obtain comments concerning the program through the use of both structured and unstructured interviews, and thirdly, explore areas of mutual involvement and assistance. The structured interview sessions were so successful in quantifying the objectives and results of the summer program that it was decided to prepare a similar questionnaire and administer it to all participants. The structured interview and questionnaire attempted to rate each objective and topic of the program on two scales; first as a contribution to the participants' immediate teaching situation and secondly, as a personally broadening experience. The scales ranged from "very worthwhile" to "of no value." Since this technique was repeated for the entire population the results of the structured portion of the interviews were not tabulated, but will be presented in the survey report. The highlights from the informal conversations are recorded and presented in chronological order of collection and identified by author. Exhibits consisting of material received from participants are available. These are on file and are listed in the Appendix.

During the trip I was directed to the Greenville Technical Education Center where I met Mr. Walters, Evening Director, Dr. Newton and Mr. Manly, both from Clemson University. Both Newton and Manly had heard of the Project and were very much interested in it. After a tour of the Greenville Center, a lengthy discussion concerning recent developments in vocational education was held with Manly. He was primarily concerned with initiating a program through which skilled craftsmen could obtain an Associate Degree and be certified to teach. This would allow present day craftsmen to more easily enter the field of vocational education. The center itself is very well equipped and I would recommend that if staff members are in the area, they stop in and acquaint themselves with the facilities and programs of the center. A catalog, announcements and descriptive program brochures are listed in the Appendix.

Some of the typical comments obtained from the participants visited were as follows.

. . . composition of the group was too broad . . . more handout material or references before lectures . . . need small homogeneous groups . . . more time should have been spent on welding . . . overall program was excellent; a very worthwhile and broadening experience . . . more discussion seminar classes . . . more selective of the kind of teachers we get in the program, concentrating on beginning teachers . . . The instructors didn't know if they should "grind it fine or coarse." . . . shorter classroom sessions, avoiding four hours of sitting . . . had both of the U.T. courses before . . . obtained quite a bit of useful information at institute . . . tours were nice but not very pedagogical . . . should evaluate schools represented and the individuals before they arrive . . . demonstrate five and six axes numerical-control machines . . . as a result of the institute, have built into curriculum, a conference leadership program . . . group was too large . . . little time to make transparencies . . . more on true position dimensioning and more sessions on programming with demonstrations and laboratory experiences. More handout materials, particularly lecture notes . . . The nondestructive testing portion of the program was particularly good. . . incorporate into the U.T. classes an opportunity to generate more material that could be brought home . . . need two teachers immediately . . . participation in these areas improved because of institute . . . an administrator rather than an instructor and liked our program concept and is extrapolating from it . . . generated a handout pamphlet on True Position Dimensioning . . . U.T. shop organization and management course was good and helped a lot . . .

The summation of individual interviews follows.

IN-SERVICE FIELD VISIT REPORT

December, 1966

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Chattanooga Tennessee	Chatt. State Tech. Institute	Kenneth E. Ross	School Catalog	French & Vierck, 10th edition, tables transparencies; K&E Technical Graphics, Edu. AV Div. Hoboken, N.J. 90 = complete set w/overlays $370. ea 1) Overhead press 2) Opaque press

COMMENTS: Mr. Ross was teaching two day classes (eleven hours per week each) and one evening class (eight hours per week). He was very depressed with his current teaching situation, saying he had been relegated to teach in the "lowly detailer-drafting area," after having generated course outlines and lesson plans for engineering materials and mechanical processes, mechanisms, machine and tool design, statics and structures. I think his depressed critical attitude carried over into his comments about the program. He felt that the composition of the group was too broad and mostly vocational people versus people from the technical level. There was much clutter in the lobby, no desks, tables or books to be used during the free time. He received credit for "curriculum building" instead of the "leadership" class that he took. The demonstrations were good but most of the material presented was a rehash of material that he was already familiar with. He would have preferred small discussion groups and prepared talks. There was too much memorization required and more handout material or references before lectures would have been beneficial. He felt that the three U.T. courses could have been combined into seminars and conducted in small homogeneous groups. He mentioned that a lot of time was wasted with "wheel spinning," partly due to the security problem. More time should have been spent on welding.

Chattanooga Tennessee	Chatt. State Tech. Institute	Jack M. Seaborn		

COMMENTS: Jack Seaborn taught two large classes at corresponding labs. The program helped him in the area of curriculum building, equipment ordering and shop organization and management. He felt that the seminar and field trips were particularly good.

Chattanooga Tennessee	Kirkman Tech. High School	Albert R. Witt	Information on Electronic Demonstrators	Basic Electricity, 2nd & 3rd edition, McGraw Hill Paul B. Zbar, Vortech; Elements of Radio, Marcus & Marcus, Prentice Hall; Electronics & Electricity Gerrish, Goodheart Wilcox Co., Homewood, Ill.; Advance Electronics Communications, Shrader, McGraw Hill; Mathematics for Electronics & Electricity, J. F. Rider Printing; Cooks Mathematics for Electronics; Hickok Teaching Systems, Inc. (Demonstration/student units), 545 Tech. Sq. Cambridge, Mass. 02159

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS

Albert R. Witt Continued

COMMENTS: Mr. Witt commented that the overall program was excellent; a very worthwhile and broadening experience. He mentioned a need for more discussion seminar classes. He commented that we should be more selective of the kind of teachers we get in the program, concentrating on beginning teachers. He felt the instructors should have emphasized recent developments instead of wasting time with quick review of things most of the people knew. The instructors didn't know if they should "grind it fine or coarse." He mentioned the need for shorter classroom sessions, avoiding four hours of sitting and mentioned that the seminar should not be held after lunch. We reviewed many of the texts and teaching aids that he used in his electronics laboratory.

Chattanooga Tennessee	Kirkman Tech. High School	Weyman H. Cunningham	Program Brochure	Basic Technical Drawing, H. C. Spencer, MacMillan Co.; Technical Drawings, Giesecke, Mitchell & Spencer; Architectural Drawing, H. W. Waffle; Overhead projector with 300 transparencies.

COMMENTS: Mr. Cunningham was teaching two day classes and one evening class. He enjoyed the program, learned quite a bit from the experience and updated his skills and knowledge. The tours were very good for background information and he utilizes the information gained. There was not enough time devoted to the welding. Mr. Cunningham has been teaching four years and plans to incorporate into his curriculum the radiography and inspection techniques picked up in the summer institute, particularly the nondestructive testing methods. He had a lot of handouts in the nondestructive area, but would appreciate more from the other topics covered. He complained that he could not take notes while the lights were out during seminars or classes, and notes should be provided by the lecturers; preferably before the lectures. He had both of the U.T. courses before, but they did allow him a chance to get some practice in these areas. We should be more selective in appointing people to the institute; some people had architectural drawing background and did not need to be in this kind of program. He felt that people with machine shop drafting experience would benefit most from our type program. We discussed his texts and use of the overhead projector with 300, mostly home made, transparencies. He mentioned that the American Lawa Corporation, a subsidiary of 3M, donated the ozalid reproduction machine to the school.

Chattanooga Tennessee	Howard High School	Warren L. Talley		Mechanical Drawing, French & Svenson ("Not too good"), McGraw Hill; Overhead projector with transparencies

COMMENTS: Mr. Talley is relatively new in the teaching field and mentioned that he obtained quite a bit of useful information at our institute. He learned how to use a 16 mm projector and overhead projector, although he felt too much time was spent on the overhead and he was not exposed to the newer techniques. He would have appreciated making some of his own transparencies and having some handout material dealing with the lectures. It would be good to expose some "bad equipment" in order to prevent people from buying inferior machines. He would have benefited from more time spent on critical path scheduling and programming. The tours were nice but not very pedagogical. Free time could have better been spent if instructors were allowed to exchange ideas. There were bad lectures but mostly good ones and individual lectures should be checked to insure uniform content throughout the program. His main aggravation with the entire program was that every time they went anywhere they had to rush, rush, rush and then wait. It sounded as though he was complaining about the security-escort arrangements.

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Marietta Georgia	Area Vocational Technical School	Guy H. Loveridge	Catalog; Program & Course Description; Photographs	List on following page

COMMENTS: Mr. Loveridge's mechanical technology shop was on a 24 hour day, educational operation. Mr. Loveridge is teaching a course in APT. Apparently, Lockheed in Marietta, Georgia has a need for people with this capability. He was most cooperative in providing textbooks and reference books used in his mechanical technology curriculum, course outlines, school catalogs and photographs. In the selection process we should evaluate the schools represented and the individuals before they arrive. He mentioned a need for more destructive testing and more actual lab time. He would have also appreciated more time on mechanical inspection, welding and fabrication. He felt that Carbide had the capability to demonstrate five and six axes numerical control machines. This would be beneficial in relating the capabilities of these newer machines. Much time was spent exchanging ideas on technical education. The two areas that needed modification were the selection criterion and arranging for small homogeneous groupings.

Anderson South Carolina	McDuffie Tech. High School	R. J. Woodbury	School Catalog; S. Carolina Trade & Industrial Education Magazine (2); Photos	Drafting & Graphics (1st yr.), Giachino & Reukema, American Technical Society, Chicago, Ill.; Technical Drawing (2nd yr. students), Gieseck, Mitchell, Spencer, MacMillon; Machine Design (seniors), Winston, ATS; Reading & Detailing/Assembly Drawing & Dies (Pt. I and II work book), Veezani, Salmonson, Royale Publishing Co., ASTME; Elementary Jig & Fixture Detailing, Bolles, Royale Publishing Co.; Overhead projector with transparencies.

COMMENTS: Mr. Woodbury claimed he taught six classes during the day and two at night. We reviewed the books that he used for his machine design course and an elementary jig and fixture design course. As a result of the institute, he has built into his curriculum, a conference leadership program in which each student leads two conferences per quarter. His main comment was that he was very much surprised with how much he was able to use from our summer institute. We took photographs of many of the school's facilities and he introduced me to the electronics instructor and the machine shop instructor. We discussed their programs, text material and demonstration equipment used in these classes.

Anderson South Carolina	McDuffie Tech. High School	W. R. Cochran	Teaching Schedule	Basic Technical Drawing, Spencer, MacMillan Publishing Co.; New Applied Mathematics, Lasley, Mudd & R, Prentice Hall.

COMMENTS: Mr. Cochran taught two applied math classes and three drafting classes. He mentioned one of the weaknesses of the program was that it did not provide basic material to bring back and use in the teaching world. The program was basically good and he learned a lot and intended to use quite a bit of what he learned. He mentioned the group was too large, there was not enough equipment and little time to make transparencies, and the like. Discussing part of our new program with Cochran and Bob Woodbury, we talked about the possibility of having a legislation review session for those concerned with the administration of vocational-technical programs and a review of available resources, such as industrial resources, gifts from manufacturers, etc.

TEXT BOOKS AND REFERENCE BOOKS BEING USED IN MECHANICAL TECHNOLOGY AT MARIETTA-COBB AREA VOCATIONAL TECHNICAL SCHOOL

Tech. Mathematics-Rice-McGraw Hill
Practical Problems in Math-Machine Trades-Delmar Pub. Co.
Basic Blue Print Reading & Sketching-Delmar Pub. Co.
Advanced Blue Print Reading Vol. I-Delmar
Advanced Blue Print Reading Vol. II-Delmar
Lathe Work-Delmar
Milling Machine Work-Delmar
Probabilities & Statics-Wolf-McGraw Hill
Machine Shop Operations & Set ups-Amer. Tech. Society
Metallurgy-Weeks-Amer. Tech. Soc.
Introductioction to Mlgy. Avner - McGraw Hill
Mfg. Processes-Production & Materials-Rusinoff-Amer. Tech. Soc.
Fundamentals of Engineering Drawing-Luzadder-Prentice Hall
Machinerys Handbook-Industrial Press
Mechanism-Winston-Amer. Tech. Soc.
Total Quality Control-McGraw-Hill
Machine Design-Winston-Amer. Tech. Soc.
Industrial Hydraulics Manual #935100-Vickers
Basic Hydraulics-Ohio State University
Welding Skills & Practices-Amer. Tech. Soc.
MIL-STD-105A-Sampling Procedures & Tables
ORD-M608-9-Quality Control
Fundamentals of Tool Design-Astme-Prentice Hall
Principles of Metallographic Laboratory Practice - Kenl- McGraw Hill
Students Workbook For Fundamentals of Tool Design-Prentice Hall
Industrial Organization and Management-McGraw Hill
Machine Shop Estimating-McGraw Hill
Motion and Time Study-Workbook and Exercises - McGraw Hill
Strength of Materials -Amer. Tech. Soc.
A.P.T. Text Book-IITRI
A.P.T. Dictionary IITRI
A.P.T. Encyclopedia-IITRI
A.P.T. Manual-&Text-Marietta-Cobb AVTS
Basic Electricity-Graham-Amer. Tech. Soc.
Applied Economics-Southwestern Publ Co.
Fundamentals of Communication-McGraw Hill
Introduction to Applied Physics-McGraw Hill

Guy H. Loveridge
December, 1966

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Pickens South Carolina	Pickens Area Vocational-Tech. School	Adger B. Hayes	Vocational & Technical Education; The American School Board Journal, October 1966	

COMMENTS: Mr. Hayes had a previous appointment and could not devote much time to the interview. We toured the shops and met Mr. Yarbrough, his supervisor. Mr. Hayes was very complimentary about the program but had no specific comments. At this time, both Mr. Yarbrough and Mr. Haues mentioned the Greenville Technical Education Center and recommended that I visit it while in the area. On visiting the center, I met Messrs. Walters and Manly and Dr. Newton. I toured the Greenville Technical Center which is quite an elaborate facility. The machine shop had two numerical-control machines, and the Technical Center also had an electronic data processing center, and was quite complete. Those I met at the center are very much interested in visiting our campus and exchanging ideas on both teacher preparation and worker training programs.

Greenville South Carolina	Greenville Tech. Center		Catalog and Program Flyers	
Gaffney South Carolina	Gaffney High School	J. W. Blanton -- not available		
Greensboro North Carolina	A&T College	Andrew W. Williams	Photographs; School Catalog	Principles of Manufacturing Materials & Processes, Campbell, McGraw Hill; Metal Work Technology & Practice, Ludwig, McKnight & McKnight Pub.; Machine Tool Operation, Pt. II, Burghart, Axelrod, Anderson, McGraw Hill; (Pt. I for entry level); Jig & Fixture Design, Delmar Pub.

COMMENTS: Mr. Williams Taught five classes. As a result of the program, Mr. Williams has requested a numerical-control jig bore machine and takes his students on tours of plants using such equipment. He would have liked more on true position dimensioning and more sessions on programming with demonstrations and laboratory experiences. More handout materials, particularly lecture notes, would be invaluable. The nondestructive testing portion of the program was particularly good. He used these kinds of things before, but the program added authority to his presentation. The only thing new encountered in our program was the numerical control machines and the deep hole drill. The U.T. programs were a good review and we should incorporate into the U.T. classes, an opportunity to generate more material that could be brought home to help the instructors. He obtained many good ideas from the visual aids program and is using much of what he learned. He has ordered an overhead projector and plans to make his own transparencies. I asked him if there was anything he needed and he said yes, he needed two teachers immediately.

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Petersburg Virginia	Virginia State College	Arnold A. Westbrook	Catalog and Program Brochure	Not teaching in a related area.

COMMENTS: Mr. Westbrook, because of a prior commitment, was not able to spend much time with me. He related that he is now teaching six classes including engineering drawing. His main comment was that the program was too broad and not specific enough for his needs.

Petersburg Virginia	Virginia State College	T. E. Turpin	Catalog and Program Brochure	Not teaching in a related area.

COMMENTS: Mr. Turpin commented that the program had too much breadth versus depth and that there were too many seminars. The exposure to industrial needs has helped his counseling efforts in which he is involved. Sessions where industrial administrators confronted educational administrators would be invaluable to vocational-technical education. Just about everything obtained would be applied in a background sense although the U.T. audio visual courses were not too helpful since he had already had them. There are many new things that could be done in audio visual courses such as incorporation of closed circuit television capabilities.

Newport News-Hampton, Va.	Virginia Peninsula Vo.-Tech. Education Center	Elvin H. Adams, Jr.	Example "Job Sheet;" "On The Job Training" description; Programmed Blueprint Reading Text	Machine Tool Operation, Pt. I & II, Workbooks 1-4; Programmed Blueprint Reading, Coover & Helsel, McGraw Hill

COMMENTS: Mr. Adams has been promoted to supervisor of a two cycle, 18 month MDTA training program. He now teaches two machining courses, supervises the MDTA training program and is assistant superintendent of the evening school. Adams is required to keep a lesson plan booklet and was now using safety operations, shop layout and management practices picked up at the institute. He has developed public relations with local shops, has formed a local advisory committee and was involved in placement of graduates including follow-up work. He said his participation in these areas was improved because of our institute. From the methods course he was writing job sheets covering detailed steps to provide course outlines. As supervisor he now teaches methods of instruction to his MDTA teachers. He gained quite a bit from the U.T. methods course that he was able to apply. He expected more shop and less class work but now he can see the worth of the theoretical approach. He felt that his MDTA appointment was definitely related to his participation in our program. Mr. Adams provided a programmed instruction blueprint reading book and a description of a cooperative education program being conducted with a local industry.

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Richmond Virginia	Richmond Public School System	William R. Eister	35 mm Slide Strip Film; School System Industrial Arts Catalog; Examples of motivational & safety visuals	Not teaching

COMMENTS: I had a short meeting with Mr. Eister. He mentioned that one definite contribution to the program is that he is now wearing eye glasses because the Union Carbide physician told him his eyesight was poor. He had no prior knowledge of this. He is in the process of launching an area vocational school, and is involved in the inception of several other experimental programs, some put on by Texaco Experiment Incorporated, a cooperating research unit. He is actively soliciting the cooperation of industry and organized labor in this area to develop these programs. Mr. Eister is an administrator rather than an instructor and liked our program concept and is extrapolating from it.

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Radford Virginia	New-River Technical School	Allen O. Kinzer	Photos; Catalog; General Information Brochure; Generated "T.P." Handout; Report on Recent Graduates' Suggess	Jig & Fixture & Learner's Manual, Vol. I & II, Columbus, Ohio, Div. Voc. Ed., Ohio; Machinery Handbook; Engineering Drawing, Zozzora
Radford Virginia	New-River Technical School	Arthur G. Rupard, Jr.	Same as above	Applications of Electronics, Gross & Kiver, McGraw-Hill; Communications Electronics, Shrader, McGraw-Hill; Radio Operators Q & A Manual, Rider; Army Training Manual 11-672, Pulse Techniques; Basic Electronics (workbook), Zbar & Sca, EIA; RCA Trainer Manual

COMMENTS: Kinzer and Rupard - Mr. Rupard teaches electronics and his general comments were that the program was very good for beginning teachers, particularly the U.T. courses. He had developed some technique with the overhead projector, however he had this course before. He obtained much more from the ORAU program than he did from a VPI summer session the year before. Mr. Kinzer has generated a handout pamphlet on True Position Dimensioning that he uses. He had both U.T. courses before, but he is now better able to use the overhead projector and has two on order. He said he received quite a bit of help from his classmates and felt the institute was very worthwhile.

CITY & STATE	SCHOOL	PARTICIPANT	MATERIAL RECEIVED	TEXTBOOKS & VISUALS
Lebanon Virginia	Russell County High School	Harold D. Owen		Drafting I & II, 2nd Year Building Trades, Drafting & Graphics, Giachino, American Technical Society; Basic Technical Drawing, Spencer; Shop Math at Work (workbook), Welton & Roger, Silver Burdett Co.

COMMENTS: Mr. Owen commented that there was a lot to get in the program at Oak Ridge, but he didn't get it all and would like to come back. He plans to use true position dimensioning and much of the mechanical technology information obtained. He would like concentration on basic mathematics in a summer institute. The U.T. shop organization and management course was good and helped him a lot. He expressed some lack of cooperation between his school and local industry in his area and we explored possibilities of enlisting their cooperation.

Bristol Tennessee	Bristol Technical School	Clifford E. Phillips		Not teaching

COMMENTS: Mr. Phillips was in the process of moving and renovating a whole school building, with student help. (The students are doing masonry work, electrical work, etc.) He is Assistant Director of the Evening School. During the day he teaches a course and is involved in administration. He said quite a bit of the electronics seminar and Carbide instructional sessions were very helpful and he has passed this information on to other instructors. It appeared that he was making a transition from teaching to administration. He previously had both U.T. courses.

Donald J. Vernine

ORAU
DJV:jc
4/21/67

Appendix

MATERIAL RECEIVED

1. Chattanooga State Technical Institute General Bulletin (Catalog)
2. A. Marietta Area Vocational-Technical School Bulletin
    B. Various program and course descriptions
    C. Photographs of present facilities
3. A. McDuffie High School Handbook
    B. South Carolina Trade and Industrial Education Magazine (two issues)
    C. Photographs of present facilities
    D. Class schedule
4. Vocational and Technical Education Magazine
5. Various program brochures and catalogs from the Greenville and Spartanburg Technical Education Centers
6. A. The A & T College at Greensboro, North Carolina Catalog
    B. Photographs of existing facilities
7. Virginia State College Catalog and Flyer
8. A. Sample job sheet
    B. Programmed blueprint reading text
    C. Description of existing co-op program in Hampton, Virginia
9. A. Richmond, Virginia Public Schools - Organization and curriculum outline of industrial arts program
    B. Plans and programs of the new Richmond Technical Center
10. A. Radford, Virginia - New River Vocational Technical School Bulletin
    B. Virginia Comprehensive Community College Bulletin
    C. Generated Concepts of True Position Study Guide
    D. Photographs of existing facilities
    E. Occupational analysis of the first four graduating classes.

1967 In-Service Institute

Follow-up Questionnaire

PREFACE

This survey report on the Training and Technology Project's 1967 In-Service Vocational-Technical Teacher Institute was prepared by Dr. D. E. Maurer, institute director, and John C. Hamel, project experimentation and training coordinator.

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MACHINE SHOP GROUP	D-99
QUESTIONNAIRE	D-102

GENERAL INFORMATION

As part of the follow-up evaluation of the 1967 In-Service Vocational-Technical Teacher Institute a questionnaire was sent to the 100 participants in February, 1968. (Copies of the questionnaire are attached to this report.)

The Institute was designed for teachers in four technical areas: Mechanical Technology and Drafting; Machine Shop and Fabrication; Industrial Electronics; and Welding-Physical Testing. The mornings were devoted to two industrial education courses—"Seminar in Industrial Education" and "New Developments in Industrial Education." Afternoons were spent in the lectures, demonstrations or shop work in the specialized technical areas. Special technical seminars and tours also were held as part of the Institute.

Eighty-nine questionnaires were completed and returned by participants.

Ninety-four per cent of the respondents indicated the Institute had definitely contributed to their career development. Fifty-seven per cent said the experience has been "very valuable" to them in their work as teachers, 33 per cent said it had been "valuable," 9 per cent rate it "moderately valuable" and 1 per cent rated it of "little value."

Ninety-three per cent said they had used information, practices, methods or ideas learned at the Institute in their teaching jobs, 3.5 per cent said they had not, while another 3.5 per cent did not respond to that question. Seventy-three stated without qualification that they would encourage other teachers to attend such an Institute, 14 per cent would do so with some reservation, 1 per cent would not recommend the Institute, and 1 per cent did not respond to the question.

Asked to rate, on a five-point scale, the value of the industrial education portions of the program, conducted by the University of Tennessee, the participants gave the following responses:

	Rating	Total Per Cent of Responses
A. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.	Very Worthwhile	47
	Worthwhile	34
	Other	19

	Rating	Total Per Cent of Responses
B. Demonstrations and Workshops by 3M, K&E and others.	Very Worthwhile	35
	Worthwhile	33
	Other	32
C. Field Trips to Planning Laboratory, K-25 Computer Center and ORNL.	Very Worthwhile	46
	Worthwhile	34
	Other	20
D. Guidance and Discussion Sessions	Very Worthwhile	45
	Worthwhile	38
	Other	17
E. Assignments as notebook, revised course outlines, transparency originals	Very Worthwhile	60
	Worthwhile	26
	Other	14
F. Receiving a complete set of the developed instructional materials.	Very Worthwhile	72
	Worthwhile	17
	Other	11

The technical portions of the institute, conducted by Union Carbide Corporation-Nuclear Division, were given the following ratings by participants:

	Rating	Total Per Cent of Responses
A. Seminars for all 100 Participants	Very Worthwhile	34
	Worthwhile	38
	Other	28
B. Technical lectures in the appointed areas.	Very Worthwhile	76
	Worthwhile	18
	Other	6
C. Laboratory or shop experiences.	Very Worthwhile	63
	Worthwhile	14
	Other	23

The following sections of this report contain a tabulation of questionnaire responses, plus verbatim comments of the participants, by technical areas.

DRAFTING GROUP

Twenty-one of 25 participants (84 per cent) returned questionnaires.

The criteria used for selection of drafting participants identified teachers who could benefit from attending the Institute. The number of applicants in this area was limited, making selection somewhat less homogeneous than other groups in the Institute. All respondents indicated they were teaching in the area directly related to the Institute experience. Of these, 50 per cent of the participants were teaching in an area directly related to the Institute experience 90 per cent or more of their teaching time. Only three teachers indicated they were teaching less than 50 per cent in an area directly related to the Institute experience.

Over 85 per cent of the respondents indicated the experience was "valuable" to "very valuable" in their work. More than 95 per cent felt the Institute contributed to their career growth. Categories of comments made relating to career growth are listed in order of frequency of the comment. The percentage making a reference to each comment is indicated.

(1)	Updating Information on Technical Developments	(38.0%)
(2)	Motivation to Continue My Education	(14.3%)
(3)	New Teaching Techniques	(9.5%
(4)	New Teaching Objectives	(9.5%)
(5)	Broadened Outlook	(9.5%)

Over 90 per cent of the respondents indicated they were using information, practices, methods, and ideas learned at the Institute in their teaching. Many comments were made regarding improved teaching methods and changes in upgrading technical content. Two-thirds of the respondents commented that they have included changes in technology in their courses of study and more than 60 per cent indicated they are using new teaching techniques.

Participants commented on aspects of the Institute that they felt were very worthwhile to them. Responses were about equally complimentary of both the Union Carbide and the University of Tennessee programs. About 62 per cent of the respondents sighted technical content presented by Union Carbide and 57 per cent of those who returned questionnaires mentioned University of Tennessee program content. Nineteen per cent mentioned the association with other teachers as being a very worthwhile experience.

Comments on aspects of the Institute participants felt could be improved are: (1) More than one-quarter of the respondents indicated the outside vendors part of the program could be improved. They were repetitive and more like sales talks, (2) Nineteen per cent felt the security restrictions were detrimental, (3) More than 14 per cent stated more time should be given to "doing" in directly related technical work, and (4) More than

14 per cent felt improvement could be made through better coordination of program components.

More than 85 per cent of the respondents indicated "definitely yes" when asked if they would encourage another teacher to attend a similar Institute.

The participants were asked to rate the worthwhileness of the University of Tennessee program categories as to how well they contributed to career growth. The following list gives the order of perceived values with the percentages of the responding participants indicating these choices.

		Very Worthwhile	Worthwhile
(1)	Receiving a complete Set of Developed Instructional Materials	71.5	19.0
(2)	Demonstrations and Workshops by 3M K & E and Others	66.7	19.0
(3)	Assignments as Notebook, Revised Course Outlines, Transparency Originals	57.2	33.3
(4)	Guidance and Discussion Sessions	57.2	28.6
(5)	Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.	47.6	42.9
(6)	Field Trip to Planning Laboratory K-25 Computer Center and ORNL	38.1	57.15

The comments relative to the University of Tennessee program emphasized receiving a set of instructional material as a worthwhile aspect of the program.

Participants were asked to rate the worthwhileness of the Union Carbide program categories as to how well they contributed to their career growth. The following list gives the order of perceived value with the percentage of the responding participants indicating the choices.

		Very Worthwhile	Worthwhile
(1)	Technical Information Lectures in the Appointed Areas	66.7	19.0
(2)	Laboratory and/or shop experiences	42.9	23.8
(3)	Seminars in groups of 100 Participants	38.1	38.1

The comments relative to the Union Carbide program noted the following: (1) Loss of time (scheduling proglems) (2) Too much activity in too small an area (facilities), and (3) Desire for more time in developing processes as numerical control, true position dimensioning, and materials testing.

The following tabulation indicates the responses to the various questions posed. When comments were made in response to a specific question, the quotation is stated as received.

I. How does your present employment relate to the skill-technical experience you received at the Institute?

I am working as a teacher, directly related to Institute experience.

N	% of N	
6	28.6	100 per cent of teaching time
4	19	90 per cent of teaching time one teacher indicated 10% of remaining time in teaching indirectly related one teacher indicated 10% of remaining time in work outside education two teachers did not specify use of remaining time
2	9.5	85 per cent of teaching time one teacher indicated 15% of remaining time in teaching indirectly related one teacher did not specify remaining time
2	9.5	80 per cent of teaching time one teacher indicated 20% of time as a school supervisor one teacher did not specify remaining time
2	9.5	60 per cent of teaching time one teacher indicated 30% of remaining time in teaching indirectly related and 10% in teaching non-related one teacher indicated 40% of remaining time in teaching indirectly related
2	9.5	50 per cent of teaching time one teacher indicated 50% of remaining time in teaching indirectly related one teacher did not specify remaining time
2	9.5	25 per cent of teaching time neither teacher specified use of remaining time
1	4.8	5 per cent of teaching time this teacher indicated 5% of time in indirectly related teaching and 90% of time in non-related teaching

II. How valuable was the Institute experience to your work?

N	% of N	
11	52.4	very valuable
7	33.3	valuable
3	14.3	moderately valuable

III. Has the Institute contributed to your career development?

N	% of N	
20	95.2	yes
1	4.8	no

Comments:

"Many new things were discussed in the way of industrial methods, trends, equipment, materials, etc. that I was completely unaware of."

"Too much confusion and not enough settling down to work on the project."

"The information presented was current. We could have benefitted more from classroom and laboratory work than the sales talks. A better balance between these two is needed."

"The Institute gives the instructors new ideas, new approaches, and better techniques."

"I wish there were more Institutes."

"I learned new information to pass on to students."

"The Institute contributed to my career by giving me educational experiences in my field and by giving me a deeper insight on the 'needs' of industry."

"Prior to attending the Institute, I felt that apprenticeship and work experience were sufficient. Since attending, all participants from my school are working toward at least an associate degree."

"The drafting section of the Institute helped me in the following areas: 1. to set up new objectives, 2. I was enlightened about new tools and techniques available, to develop an up to date library for the drafting room, and 3. The exchange of ideas was very enriching."

"I am now working on a grad program at MSU night school to continue my education."

"Broadened my outlook on education as a whole in the Southeastern states."

"It helped to improve many facets of my work; however, I expect to utilize more as money and equipment can be made available."

"It made me very conscious of the fact that I continue my education so that I may keep abreast of the new methods and materials that are being used by industry."

"Limited but useful. I feel that my area and high school level benefited more than trade school and/or other areas (Mobile, Alabama)."

"I learned a great deal from attending the past summer."

IV. If you are teaching or supervising school programs, have you used information, practices, methods or ideas learned at the Institute in your assignment?

N	% of N	
19	90.5	yes
1	4.75	no
1	4.75	no answer

Comments:

"I am stressing large, clear lettering more in my drafting classes now since I found out that drawings are quite frequently reproduced to half scale and also put on microfilm. Also I plan to familiarize my students with true position dimensioning."

"True position information, numerical control information and physical testing have been of great help in preparing day-to-day lessons."

"The course taught me a better approach to drafting as related to the machinist, welding and electronic trades."

"A-Tape control machine programs. B-Engineering materials and process lectures. C-New equipment. D-True position dimensioning."

"Explaining the process that drafting paper is manufactured and new materials used in drafting and engineering such as Mylar film and lazer beam used in surveying."

"(1) More use of visual aids, job sheets, information sheets and etc. (2) The use of "press type" letters and other new media on the market."

"True position dimensioning added to machine shop blue print reading. Simplified wiring, from facility engineering, added to electrical blue print reading. Transparencies and lesson plans being used in other classes, value analysis added to tool and die making N.C. and E.D.M. requested for new course tool and die making and design."

"Visual aids, demonstration procedures."

"The consultants, company representatives, instructors and supervisors contributed very useful information in these areas;

1. How to best use equipment to its fullest capabilities.
2. How to assign projects in their entirety to groups in the drafting room.
3. I am using addresses secured from the institute to gain useful handouts for the students as well as for other teachers."

"(1) Use of microfilming in industry. (2) Use of transparencies to more benefit. (3) Discussion of N. C. machines. (4) Use of Drafting films. (5) True Position Dimensioning has been added to outline."

"More attention to preparation of lesson plans. More use made of transparencies (made by teacher) to fit the occasion in discussions and lessons."

"The overview of some modern industrial application. True position dimensioning. Testing. Transparencies."

"Contributed to my general understanding of modern industrial methods."

"I have been able to give instruction in the area of True Position Dimensioning, lectures and films on numerically controlled machining and drafting, and the advantages of Critical Path Scheduling."

"Funds and equipment do not allow me to use benefits from training at ORAU other locations and with teaching aides, there would be much benefit. Mostly teaching aides."

"(1) Developed course in Machine Drafting and Tool Design. (2) Applied visual aids to all classes."

"I used a lot of the lesson plans and transparencies developed the past summer. "

"I incorporated into my program many of the items covered in the U. C. sessions. Especially the materials on the draftsman's role in industry. Also I have used successfully the concept of a design group to solve design problems in much the same manner that we worked out lab problem."

"Transparencies have been made and used in my field. Have also made transparencies for other department with the material sent me by the institute. All the material received is of real value. Thanks."

V. Please comment on the aspects of the Institute that you felt were very worthwhile to you.

"(1) True positional dimensioning. (2) Numerically controlled machines. (3) The outside vendors who came in prepared to elaborate and answer any questions on their equipment such as THE DIETZGEN CO.

"No comment."

"The advanced information such as N/C, True position, value engineering, future trends or directions in research, USOE information, legislation dealing with education etc. were all worthwhile subjects."

"The types and operations of new drafting methods, machines and drafting equipment."

"(1) Introduction to new equipment. (2) Information transfer (student-student, student-instructor). (3) Instruction methods. (4) Lesson plan preparation. You name it, it was worthwhile."

"All seminars pertaining to drafting media-value analysis, critical path, safety."

"(1) The UT seminars. (2) The Union Carbide seminars. (3) Technical information in the area of drafting. (4) The latest development in Vocational Education by Dr. Childress."

"Physical testing, plastic tooling, counseling-testing, numerical control, tool design-lab, true position dimensioning, planning lab. (New school now under construction) Instruction sheets-lesson plans visual aids, seminars-V. E. in 10 SE states, V.I.C.A., A.V.A., Future Developments - Dr. Goown."

"Visual aids - Teaching procedures."

"The part of the Institute that was very worthwhile to me was the UT portion."

"Worthwhile aspects of the institute (1) Lectures (Mr. Childers, Miss Ellis, and others) gave me some useful knowledge pertaining to Vocational Technical Education and The American Vocational Association. (2) The display of products and materials (3) The association with other teachers of long experiences."

"I thought the entire Institute was worthwhile to me."

"Becoming aware of what was taking place in other areas. Sharing of common interests with teachers in disciplines."

"Contact with people in modern industry. "Contact with new methods to be used in education."

"Association with instructors from other states."

"Demonstrations and workshops. Technical lectures. Laboratory assignments."

"Teaching aides, equipment and materials. ORAU lectures and seminars. More useful than Union Carbide contribution."

"(1) Course outlines. (2) Construction of visual aids. (3) New developments in Vocational-Technical Education."

"The Union Carbide portion of our program."

"I feel that the most worthwhile part of any Institute is the association with other people. I gained a lot of information from just discussing various things with the Union Carbide people and the other teachers attending the Institute."

"The session with Union Carbide were of great interest. I wish we could have programmed some tapes, operated N. C. machines, seen and participated in more actual work. We were restricted too much.

VI. Please comment on any aspect of the Institute that you feel could be improved and possibly make recommendations as to how the improvements could be implemented.

"The outside vendors should be lined up well in advance and should be aware of the number and caliber of the people they would be contacting so they should come prepared with displays and personnel who have the answers - not just salesmen."

"Have a planned program that is not interrupted by another class."

"Lower the number and length of sales talks. These were somewhat informative but an inordinate amount of time was devoted to them. One must be selective - there's too much to cover."

"A further improvement of the existing program. It certainly has the correct objective and with a few added innovations, it would be a great help to any teacher or supervisor."

"More closely coordinated from class to class sessions, otherwise, OK."

"There was too much time wasted in evenings. There was too little time spent in the drafting room at the board. There should be movies to fill in any unused time. The students should never be excused early. It forms a bad image."

"Tests should not be given on the first day after a long tour of the physical plant. If a long tour is given the first day tests should be given on the second day."

"Tool design should be more closely related to practical experiments. Many draftsmen expressed need for demonstrations such as numerical control, E.D.M., gages, practical metal forming, injection molding."

"No comments."

"I think the Union Carbide portion of the Institute should be improved a great deal. Especially in the drafting area."

"One area I feel could have been used more was in the area of lectures. I believe it would prove profitable to invite superintendents, managers and presidents of large corporations to talk and answer questions from the participants."

"Perhaps a little more cooperation from vendors who demonstrated equipment would help."

"Vendors (demo's and workshops) and guest lecturers should submit resume of seminar prior to delivery. Many were unprepared or offered their material in haphazard manner. Review by UT personnel could eliminate this."

"Get the university part of the program out of the security atmosphere — move it to Associated University or to the campus."

"Such an institute should be located where there is not so much security. Participants should be able to see actual industry in action."

"Less time given to some vendors. More time given to the individuals directly related technology. More adequate classroom space. Better coordination between the Institute and Union Carbide personnel."

"More overall organization and more application and contribution by Union Carbide."

"The Institute could be greatly improved by moving it to the UT campus. Field trips could be conducted to the various local industries for observation and study of new techniques."

"I feel that repetition of programs presented such as K and E and Dietzgen could have been eliminated."

"I feel that the Institute was quite worthwhile. I do believe however that we could have gained more if security restrictions could have allowed us to see more of the actual work of Union Carbide. If this problem can't be handled, I believe some industry that is not involved in such classified work should be used."

"Get the teacher in the middle of the activities of industry. Let him learn by doing. Give some choice of activities and programs that can be attended. Some of the UT sessions I was already familiar with."

VII. Would you encourage another teacher to attend a similar institute to the Institute you attended?

N	% of N	
18	85.7	Definitely yes
2	9.5	Yes, with reservations
1	4.8	No opinion

VIII. Please rate the worthwhileness of the following University of Tennessee program categories.

A. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.

N	% of N	
10	47.6	Very worthwhile
9	42.9	Worthwhile
2	9.5	Moderately worthwhile

B. Demonstrations and Workshops by 3 M, K and E, and others.

N	% of N	
14	66.7	Very worthwhile
4	19.0	Worthwhile
2	9.5	Moderately worthwhile
1	4.8	Of little value

C. Field trips to planning Laboratory K-25 Computer Center and ORNL.

N	% of N	
8	38.1	Very worthwhile
12	57.15	Worthwhile
1	4.75	Moderately worthwhile

D. Guidance and Discussion Sessions.

N	% of N	
12	57.15	Very worthwhile
6	28.6	Worthwhile
3	14.25	Moderately worthwhile

E. Assignments as notebook, revised course outlines, transparency originals.

N	% of N	
12	57.2	Very worthwhile
7	33.3	Worthwhile
2	9.5	Of little value

F. Receiving a complete set of the developed instructional materials.

N	% of N	
15	71.5	Very worthwhile
4	19.0	Worthwhile
2	9.5	Moderately worthwhile

Comments:

"Better facilities should be provided for meetings both for the large group of 100 and the small groups. The vending area was a poor place to have discussion sessions."

"Don't fail to realize that the association with other institute members, though hard to evaluate. Is most worthwhile and important."

"The set of instructional material is of great use, not only to me, but to my fellow instructors. Many thanks."

"I feel that the student should be exposed to more computer - its uses."

"This half of the program was very good. I really enjoyed it. The information has helped me a great deal. Thanks."

"I am using transparencies and other instructional materials as well as sharing with other teachers throughout the area."

"I would like to have a copy of my revised course outline."

"Eliminate duplication of demonstrations. Set 3 days or 1 week period aside for demonstrations and workshops. Vendors could set up booths, and have literature available."

"Receiving the material of the other fields or area is nice but not worth the expense."

"Item 9d (VIII,D) benefited school more than trainees, I feel, so graded on anyway."

IX. Please rate the worthwhileness of the following Union Carbide program categories as to how they contributed to your career growth.

A. Seminars in groups of 100 participants.

N	% of N
8	38.1
8	38.1
4	19.0
1	4.8

B. Technical information lectures in the appointed areas.

N	% of N	
14	66.7	Very worthwhile
4	19.0	Worthwhile
2	9.5	Moderately worthwhile
1	4.8	Of no value

C. Laboratory and/or shop practical experiences.

N	% of N	
9	42.9	Very worthwhile
5	23.8	Worthwhile
3	14.3	Moderately worthwhile
4	19.0	Of little value

Comments:

"The scheduling could have been better. We had too much lost motion in trying to be at the right place at the right time."

"We need to inform the typical T and I teacher of his importance of this area of education for he is probably better at vocational guidance than we think. He does need training along the lines of tests and measurements etc."

"The knowledge gained in all categories has been a great help to me. If accepted, I will be happy to attend another."

"All the instructors were very mannerly but I had the feeling Union Carbide was trying to shove the teachers out that we were not needed or wanted. First, it started with what machine we were to get our milk and food from because it was interfering with the work of one area of the plant. Next we were told not to use a certain door because we were disturbing employees in an area. Next we were told not to enter the drafting shop until 11:50 because we were disturbing the students of the M.D.T.A. All in all, I felt there is too much activity going on in too small an area."

"The Summer Technical Institute is a great asset to Vocational Educators and therefore should be continued if possible."

"Ashland Vocational School would welcome an invitation for our instructors to any future institute."

"This part of the program was little or no value to me. I think it should be improved a lot."

"More time on True Position. Also more on NC."

"Lab experiences in such items as quality control and materials testing would have been much more helpful than the lab project that was given.

"Numerical control was one of the most talked about items at the school, but we were never exposed to a machine in actual operation."

"(1) The institute lacked a continuity and in some case a lack of organization and planning. (2) Some speakers seemed unsure of just what was expected from them. (3) The welding department in my school is making use of the transparency materials that I passed on to them. (4) The studying facilities during the "note book making" sessions was woefully inadequate and not conducive to good work and morale of the group."

"Time spent with little gained."

"Our laboratory experience could have been coordinated better - by this I mean, our design project could have meant more to all of us if we had received more strength of materials."

"I am extremely pleased that I was given the opportunity to attend the institute. I wish security had not been so tight, and that we could have participated in some of the activities we only heard about."

WELDING-PHYSICAL TESTING GROUP

Twenty-four of 25 participants (96 per cent) returned questionnaires.

Ninety-six per cent of the respondents indicated they were teaching in a directly or an indirectly related area to the Institute experience. Sixty per cent were teaching in the area directly related to the Institute experience 100 per cent of their teaching time. Only one respondent was not teaching in a directly or indirectly related area.

One hundred per cent of the respondents rated the experience "valuable" to "very valuable" in their work. They all indicated the experience contributed to their career growth. Categories of comments made relating to career growth are listed in order of frequency of the comment. The percentage making a reference to each comment is indicated.

(1) The Institute Builds Self Confidence	(16.6%)
(2) Insight for Innovation of Curriculum Change	(12.5%)
(3) Understanding of Vocational Education	(12.5%)
(4) Recognition Received	(8.3%)

All of the teachers indicated they were using information, practices, methods, and ideas learned at the Institute in their teaching. Many comments were made regarding improved teaching methods and changes in upgrading technical content. Almost 60 per cent of the participants made comments about upgrading their course technology. More than 45 per cent indicated they had updated their teaching methods and three out of eight were using the course outlines and lesson plans prepared at the Institute.

Participants commented on aspects of the program that they felt were very worthwhile to them. About one-third of the respondents felt the whole program was very good. Half of those responding commented on physical testing aspects as being particularly worthwhile. The actual shop experiences, field trips and technical lectures were each noted by 17 per cent of the respondents. The sessions on visual aids were mentioned by more than 20 per cent and the group discussions and seminars were noted by 12.5 per cent as being very worthwhile.

Comments on aspects of the Institute participants felt could be improved are:

(1) One out of six respondents mentioned the vendors sessions as being repetitive and should be improved.

(2) One out of six respondents commented that new welding processes should be included in the lab or made more accessible.

(3) One out of eight stated the workshop sessions could be improved by making smaller groups and have more frequent sessions.

(4) One out of twelve commented on each of the following: Have more field trips, have more time in shops and labs, and lectures should be better prepared.

More than 95 per cent of the respondents indicated "definitely yes" when asked if they would encourage another teacher to attend a similar institute.

The participants were asked to rate the worthwhileness of the University of Tennessee program categories as to how well they contributed to career growth. The following list gives the order of perceived values with the percentages of the responding participants indicating these choices:

	Very Worthwhile	Worthwhile
(1) Receiving a Complete Set of Developed Instructional Materials	91.7	8.3

		Very Worthwhile	Worthwhile
(2)	Assignments as Notebook, Revised Course Outlines and Transparency Originals	70.8	20.8
(3)	Seminars: Vocational Technical Education, AVA, Legislation, ERIC, etc.	54.2	29.15
(4)	Field Trips to Planning Laboratory, K-25 Computer Center and ORNL	45.9	20.8
(5)	Guidance and Discussion Sessions	33.3	58.4
(6)	Demonstrations and Workshops by 3M, K & E, and Others.	29.15	37.5

Fifty per cent of the comments indicated an appreciation for the instructional materials received.

Participants were asked to rate the worthwhileness of the Union Carbide program categories as to how well they contributed to their career growth. The following list gives the order of perceived value with the percentage of the responding participants indicating the choices.

		Very Worthwhile	Worthwhile
(1)	Technical Information Lectures in the Appointed Areas	95.8	4.2
(2)	Laboratory and/or Shop Practical Experiences	87.5	4.2
(3)	Seminars in Groups of 100 Participants	50.0	12.5

The comments relative to the Union Carbide program emphasized the following: (1) About 25 per cent of the comments said they were pleased with what they received, and (2) About 12.5 per cent said they would have benefited from more laboratory experiences related directly to their teaching.

The following tabulation indicates the responses to the various questions posed. When comments were made in response to a specific question, the quotation is stated as received.

I. How does your present employment relate to the skill-technical experience you received at the institute?

I am working as a teacher, directly related to Institute experience.

N	% of N	
14	58.45	100 per cent of teaching time
1	4.15	90 per cent of teaching time other 10% not specified.
1	4.15	75 per cent of teaching time other 25% in indirectly related teaching

N	% of N	
1	4.15	50 per cent of teaching time other 50% not specified.
1	4.15	40 per cent of teaching time other 50% in indirectly related teaching
1	4.15	20 per cent of teaching time other 80% not specified
1	4.15	This teacher did not specify time allotments but indicated he was teaching directly related, indirectly related or non related subjects.

I am working as a teacher, indirectly related to Institute experience.

N	% of N	
2	8.35	100% of teaching time
1	4.15	35% of teaching time other 65% not specified

I am working as a teacher, not related to Institute experience.

N	% of N	
1	4.15	100% of teaching time

II. How valuable was the Institute experience to your work?

N	% of N	
19	79.2	Very Valuable
5	20.8	Valuable

III. Has the Institute contributed to your career development?

N	% of N	
24	100	Yes

Comments:

"As a new teacher the institute contributed greatly to me as a teacher."

"I learned the many ways of testing weld joints and metals and have taught this to my students and also the importance of testing of weld joints."

"I feel as though the visual aids could be cut in half, or omitted completely."

"Received the updating I needed in this area."

"I have been selected on a Committee by the University of Kentucky to set up a Course Outline to be used statewide by the Vocational Schools in Kentucky."

"Many different phases of welding were at my disposal and through practice has helped me greatly, many of the experiences received, I was able to work in conjunction with other teachers who are directly involved with metals, both in welding and physical testing."

"Training builds confidence, I am a better instructor for having attended this Institute. Thanks very much for making this possible."

"Since attending the institute I have been consulted by several people in industry on specific problems related to welding, by vocational education leaders in this area on how to improve or implement new or existing programs and I have received several job offers directly related to institute experience; also, primarily through my association with other instructors, a new insight into vocational education. I seem to have gained a great deal of prestige as a result of attending the institute and would like to repeat the experience."

"The institute has been of great value to me in developing a curriculum and teaching aids for my welding classes. The new ideas gained from the institute have helped to motivate the students to a higher level of achievement."

"I am using some of the visual aid developed at the Institute. I think it is a great help to do a better job."

"It has added to my college credits."

"The institute gave me more depth in vocational technical education and a greater insight as to the job of the instructor."

"I think the institute has been very helpful to me as an instructor. I would like to be able to attend another like it sometime."

"My school plans to improve our course."

"I would like an advanced course in any vocational seminars or institutes."

"School has not purchased equipment needed."

"Use my notes and materials almost every day, along with the knowledge which I gained."

IV. If you are teaching or supervising school programs, have you used information practices, methods or ideas learned at the Institute in your assignment?

N	% of N	
24	100	Yes

Comments:

"I have used the course outline and lesson plans to set up my program this year, and the welding experiences were used in teaching welding."

"I have taught my students some of the welding techniques that I learned and have been stressing safety precautions, etc."

1. Figuring % of elongation used in Math and Testing.
2. Some of TIG Welding applications
3. Group Teaching aids

"The entire program was very good, and the course outlines received is being used almost daily."

"Updating of techniques acquired at the institute, now being taught to students."

"This year I have revised my course outline to include some of the things I learned at the institute. This I feel would be of great value to my students, as this was something new to them as well as myself."

1. Now using job sheets, assignment sheets.
2. "You made it possible for me to use more transparencies."
3. "I am now better qualified to teach welding metallurgy and machine processes."

"I have personally used a great deal of the literature I received and have disseminated this material to approximately 15 other vocational instructors in this area and according to verbal reports, it has been invaluable to them, particularly to new instructors."

"Liquid Penetrant and Guided Bend Test have been incorporated into the welding program. After welding practice has been made in each position, the three best welds in each position are taken and subjected to liquid penetrant and guided bend test. Radiographic test and Ultrasonic test are discussed for these particular welds, in so much as facilities are not available for these tests at the present time."

1. The use of overhead projectors and lesson plans
2. Physical testing of welding

1. Various uses of non-destructive testing
2. Using more visual aids worked up at the institute
3. "Have used many helpful suggestions and ideas from other instructors in the group."

"The Institute helped me as a teacher in many ways, even though I have many years of welding experience I am new as a teacher. I learned many things and methods from the Y-12 instructors and the lectures that they gave. I also gathered much valuable knowledge from the other welding instructors students just by talking and listening to each of them. I have been much better on giving group lectures, because I learned just how to go about it while I was at the Institute."

"I have used a number of the masters transparencies because they go along with my course."

"I have included in my course outline a portion of the physical testing program we had at the institute and also I use more visual aids, and the course outline we prepared while at the institute."

"I have tried to use the mothods used in the Y-12 training program. I think they were very good. I have found the lesson plans very helpful."

"Physical testing, which I had not used before."

"We are setting up a program in physical testing."

"Some of the welding techniques have been used in my shop along with the use and making of transparencies."

1. Used lesson plans
2. Used transparencies masters

"I have used lesson plans, audio visuals and other instructional materials developed at the institute. I have also benefited from the hand outs and salesmans literature."

1. In telling of the more models
2. Methods of welding

"Have used many of the same teaching methods used at the institute."

V. Please comment on the aspects of the Institute that you felt were very worthwhile to you.

Comments:

"The whole program was worthwhile to me in my teaching and the actual experiences in Y-12 shops were really worthwhile."

"Information on the latest welding equipment now in industry—example—ultra-sonic."

1. Procedures used in Physical Testing
2. Group discussions
3. Demonstrations and Lectures

"The physical testing, was of greater value to me. This program does assist greatly in our program."

"Received valuable information from all meetings, sessions, etc."

"I was particularly interested in the demonstrations of the newer types of welding such as submerged arc, etc., and welding in the future. The University of Tennessee Seminars, as well as the Union Carbide Seminars supplied much valuable information that can be referred to and used from time to time in teaching."

"The lectures and field trips presented by Y-12 to me was very-worthwhile. I gained quite a bit from the Y-12 lectures."

1. Experience in the Physical Testing Laboratory.
2. "I enjoyed every minute of Mr. Estes classes."
3. "Guidance sessions and test are very worthwhile."
4. "The group seminars and field trips were excellent."

"Most all the lectures on vocational education and things directly related to my field, such as the lectures by Mr. Carey on Metallurgy and most of the laboratory experience in Physical Testing."

"I feel that the demonstrations and workshops were very good, specifically, the 3M Company, Lincoln Electric, Radiation Safety, Visual Education and all phases of Welding and Physical Testing. I felt that on a whole the University of Tennessee and Union Carbide seminars were very good also."

1. Instructions in the use of Visual equipment
2. The seminars on AVA
3. The Union Carbide Laboratory sessions on Physical Testing

1. Lectures by Technicians and Engineers
2. Laboratory and shop work
3. Preparation of Visual aids Materials

"The Physical Testing seems to be very worthwhile."

"The lectures on metal, metallurgy, and physical testing were very worthwhile, also the lab work on testing and welding was very worthwhile. The lectures and demonstrations on visual aid helped me very much. The master for the transparencies has been a great help to me in my teaching. I have made transparencies out of the masters and I use them two and three times a week."

"The total program was worthwhile and preparing of visual aids and instructional material has helped my program the most."

"They were all worthwhile. The on-the-job training was probably more interesting."

"Being with the other instructors and learning new ideas. I feel all of the Institute was worthwhile to me as an instructor."

"It was all very good."

"The welding was very worthwhile and I enjoyed the field trips we made. Some of the seminars were very educational and some did not pertain to a specific field."

1. Physical Testing

"I feel that most of the workshops, field trips and lectures were worthwhile even though there was room for improvement in some of the lectures. The field trips and welding lectures were very valuable to my teaching needs."

1. Computer, X-Ray, Mag. Particle

"The experiences in the physical testing laboratory were most helpful."

"All aspects of the institution are very worthwhile except visual-aid (Too Much)."

VI. Please comment on any aspect of the Institute that you feel could be improved and possibly make recommendations as to how the improvements could be implemented.

Comments:

"I think if anything could be improved, it would be a more varied experience in the shop as lab. work."

1. More workshops—smaller numbers
2. Less repetition or duplication of equipment

"Equipment demonstrations could be put on a competitive basis."

"Make plasma arc, lazer beam, and tig more prominent in the welding lab."

"In some areas the communication would bog down from time to time."

"The Training Aids I feel is a bit too commerical and tends to take away from the institute the fellows seem to feel that this has very little bearing on the institute."

1. "Less time on K and E--3-M workshops and more seminars."
2. "More time spent on supervision of the developed instructional materials. (These are valuable and I feel we students could have produced even better ones.)"
3. "Limit welding instructors to a minimum of three years welding experience in industry."

"Not enough space or equipment was available to hold a good workshop or visual aid material, I believe this could be eliminated and replaced by more field trips or lab. work in each particular field."

"I feel that the Guidance sessions could have been improved by gearing the guidance topics toward the students, rather than the teachers involved in the institute. I feel that the institute should include more field trips."

"If at all possible make available for observation and instruction some of the newer welding methods that were in restricted areas."

"Laboratory and shop work should be given more time if possible."

"The first few days seem to be a little slow in Welding-Physical Testing. But every class or program is that way at first."

"I think that it would be a great improvement if the Institute didn't rush the men to fast on the first two or three days of the course. The tests were good, but like myself, they got me all nervous and upset. I think the test from the Guidance counselor should be staggered throughout the course. Let the men settle down and get used to the place and I think that they will score better on the test. I know that I would anyway."

"If the institute could have more access to a building with modern equipment in operation it would be an advantage to all teachers."

"The workshops could have been better. Could be more planning would help."

"There was too much advertisement by the visual aid people. This should be from an educational point of view only."

"Have all seminars held in a specific field and have lab work when at all possible. Most instructors know their field and when they attend institutions they look for new things in their trade. Have the latest developments in each field and all the technical information about each institute."

"Hold Audio Visual Lectures to shorter sessions. Do not have any lectures to last over 1 hour without a break. Keep workshop groups small. Ask people that give technical lectures to keep them well organized and have lectures prepared in advance."

"The lectures of Union Carbide."

1. More up-to-date welding equipment
2. More shop practical experiences

VII. Would you encourage another teacher to attend a similar Institute to the Institute you attended?

N	% of N	
23	95.8	definitely yes
1	4.2	yes, with reservations

VIII. Please rate the worthwhileness of the following University of Tennessee program categories as to how they contributed to your career growth.

A. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.

N	% of N	
13	54.2	Very Worthwhile
7	29.15	Worthwhile
3	12.5	Moderately Worthwhile
1	4.15	Of No Value

B. Demonstrations and Workshops by 3 M, K & E, and others.

N	% of N	
7	29.15	Very Worthwhile
9	37.5	Worthwhile
4	16.7	Moderately Worthwhile
3	12.5	Of Little Value
1	4.15	Of No Value

C. Field trips to planning Laboratory, K-25 Computer Center and ORNL.

N	% of N	
11	45.9	Very Worthwhile
5	20.8	Worthwhile
8	33.3	Moderately Worthwhile

D. Guidance and Discussion Sessions.

N	% of N	
8	33.3	Very Worthwhile
14	58.4	Worthwhile
1	4.15	Moderately Worthwhile
1	4.15	Of Little Value

E. Assignments as notebook, revised course outlines and transparency originals.

N	% of N	
17	70.8	Very Worthwhile
5	20.8	Worthwhile
1	4.2	Moderately Worthwhile
1	4.2	Of Little Value

F. Receiving a complete set of the developed instructional materials.

N	% of N	
22	91.7	Very Worthwhile
2	8.3	Worthwhile

Comments:

"Less 3 M and K & E."

"I especially appreciated receiving a complete set of the developed instructional materials, and have found them very useful in my teaching."

"Too much Visual Aid."

"All of the demonstrations and workshops helped me. Now I run my own transparencies off. Before I had to call on someone else to do it."

"All of these categories were very well planned and receiving the instruction material was the nicest thing that could be done for a teacher. (Thanks)"

"Some workshops were repetitious and were too crowded. The instructional material may be used in the years to come and can help other instructors who did not attend."

"Appreciate all material received."

"After being away from the institute a few months I have had time to evaluate my experiences and use some of the material. I have found them very useful."

"I would like very much to return for another summer to gain more experience in the same field."

IX. Please rate the worthwhileness of the following Union Carbide program categories as to how they contributed to your career growth.

A. Seminars in groups of 100 participants.

N	% of N	
12	50.0	Very Worthwhile
9	37.5	Worthwhile
3	12.5	Moderately Worthwhile

B. Technical information lectures in the appointed areas.

N	% of N	
23	95.8	Very Worthwhile
1	4.2	Moderately Worthwhile

C. Laboratory and/or shop practical experiences.

N	% of N	
21	87.5	Very Worthwhile
1	4.2	Worthwhile
2	8.3	Moderately Worthwhile

Comments:

"I would recommend more laboratory experiences. I gained a lot of good information and ideas from the Carbide and Institute participants and feel I learned a great deal that has been helpful to me."

"Would like to attend another Institute of a similar nature."

"If any way possible include more of these. I am sure it will create more interest."

"I think Mr. Jack Johnson and Mr. George Burton should be commended for doing an excellent job as instructors for Union Carbide, they are very sincere, helpful and knowledgeable."

"I felt that the Union Carbide program was exceptionally good and a valuable experience."

"I have been able to pass along materials sent me to other instructors and much of it is being used outside my area."

"This is ideal for Vocational Instructors in the summer. I have been a welding instructor for five years and this has been the best program that I have attended."

"Yes, the institute is doing a very worthwhile think in bringing all these instructors together. We learn much from the Institute and I learned much from the other instructors. My time up at the Y-12 Plant was well spent. (Keep up the good work.)"

"These categories were very worthwhile and the instructional staff was outstanding. This was the best training program I've had the privilege to attend."

"Only that I wish each of you every bit as much success with future institutes as I feel this one was."

"Very good in every way."

"Some of the seminars were not in my field and could have used the time at the lab. or shop. A man teaching is always looking for new means of teaching and new developments in his field or work or trade."

"More of B and C—Technical and Laboratory."

"The lectures and workshops that I remember to be most instructive were the welding lectures. Some of the 100 group sessions were very good."

"Thanks very much for selecting me for this training."

ELECTRONICS GROUP

Twenty-three of 25 participants (92 per cent) returned questionnaires.

All the respondents indicated they were teaching in the area directly related to the Institute experience. Over 40 per cent were teaching electronics 100 per cent of their teaching time. The average time respondents were engaged in directly related teaching was over 63 per cent. Indirectly related teaching was usually noted for those hours not in directly related teaching. One participant indicated he was working outside education in electronics.

Over 91 per cent of the respondents indicated the experience was "valuable" to "very valuable" in their work. Eighty-seven per cent felt the Institute contributed to their career development.

Comments named three ways the Institute contributed to their career growth: (1) improved knowledge of industries needs and trends, (2) direction for future teaching content, and (3) improved teaching techniques.

About 90 per cent of the respondents indicated they were using information, practices, methods and ideas learned at the Institute in their teaching. Many comments were made regarding improved teaching methods and changes in upgrading technical content. More than 80 per cent of the respondents commented that they have made changes in their courses of study updating the technology. More than 20 per cent of the returns mentioned improvements in teaching methods and 13 per cent stated new courses were being planned as a result of the Institute experience.

Participants commented on aspects of the Institute that they felt were very worthwhile to them. Over half mentioned aspects of the technical program as being very worthwhile. More than 20 per cent mentioned guidance group discussions as being very worthwhile. Association with other instructors and all aspects of the program were each noted as being very worthwhile by more than 17 per cent of the respondents. Comments on aspects of the Institute program participants felt could be improved were: (1) more than 20 per cent stated vendors should be better prepared, (2) thirteen per cent indicated vendors were given too much time, (3) thirteen per cent desired more time for their major technical area and (4) thirteen per cent mentioned workshop groups should be smaller and grouped according to needs of teachers.

About three-quarters of the respondents indicated "definitely yes" when asked if they would encourage another teacher to attend a similar institute. The remaining responses were "yes, with reservations."

The participants were asked to rate the University of Tennessee program categories as to how well they contributed to career growth. The following list gives the order of perceived values with the percentages of the responding participants indicating these choices:

		Very Worthwhile	Worthwhile
(1)	Guidance and Discussion Sessions	60.9	26.1
(2)	Field Trips to Planning Laboratory and K-25 Computer Center	60.9	26.1
(3)	Assignments as Notebook, Revised Course Outlines and Transparency Originals	52.2	17.4
(4)	Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.	47.85	34.8
(5)	Receiving a Complete Set of the Developed Instructional Materials	43.5	34.8
(6)	Demonstrations and Workshops by 3M, K & E, and Others.	17.35	34.8

Most of the comments related to receiving instructional materials. Three respondents were very pleased with what they received and two felt the materials would have been better if they were group coordinated and for their skill-technical area only.

Participants were asked to rate the Union Carbide program categories as to their contribution to career growth. The following list gives the order of perceived value with the percentages of the responding participants indicating the choices.

		Very Worthwhile	Worthwhile
(1)	Technical Information Lectures in the Appointed Areas	73.9	21.75
(2)	Laboratory and/or Shop Practical Experiences	73.9	17.4
(3)	Seminars in Groups of 100 Participants	26.1	34.8

The comments relative to the Union Carbide program had one repeating theme: "I would like to go again."

The following tabulation indicates the responses to the various questions posed. When comments were made in response to a specific question, the quotation is stated as received.

I. How does your present employment relate to the skill-technical experience you received at the Institute?

I am working as a teacher, directly related to Institute experience.

N	% of N	
10	43.5	100 per cent of teaching time
1	4.35	80 per cent of teaching time. This teacher indicated 20% of time in indirectly related teaching.

N	% of N	
1	4.35	75 per cent of teaching time. This teacher indicated 10% of time in indirectly related teaching and 15% in non-related teaching.
2	8.7	70 per cent of teaching time. One indicated 30% in indirectly related teaching. One did not specify the remainder of the time.
1	4.35	60 per cent of teaching time. This teacher did not specify the remainder of the time.
1	4.35	40 per cent of teaching time. This teacher indicated 50% of time in indirectly related teaching and 10% in non-related teaching.
1	4.35	30 per cent of teaching time. This teacher indicated 70% of time in indirectly related teaching.
1	4.35	25 per cent of teaching time. This teacher did not specify the remainder of the time.
1	4.35	10 per cent of teaching time. This teacher indicated 90% in indirectly related teaching.

I am working as a teacher, indirectly related to Institute experience.

N	% of N	
3	13.0	100 per cent of teaching time

I am working outside education, in work directly related to Institute experience.

N	% of N	
1	4.35	100 per cent of time

II. How valuable was the Institute experience to your work?

N	% of N	
13	56.5	Very Valuable
8	34.8	Valuable
1	4.35	Moderately valuable
1	4.35	Of Little Value

III. Has the Institute contributed to your career development?

N	% of N	
20	87.0	Yes
3	13.0	No

Comments:

"Yes, I am now working as a design engineer for R.F.I. Filters."

"It has given more direction to my future programs and possible insight to what should be taught in the future."

"I feel that by gaining a much better picture of the trends and needs of both education and industry, I am better qualified to assist in meeting those needs. Experience gained through the Institute has made my work easier, and enabled me to do a better job with my students."

"The graduate credit given for the Institute gave meaning to the certificate from the University of Tennessee."

"Was directly responsible for a forthcoming appointment to head-teacher."

"In relating to my class the need for trained technicians for Industry. I feel I can do a better job after being exposed to Industry and seeing the methods in use."

"In my decision to teach in industrial electronics instead of Basic Electronics."

"The Institute was very helpful in gaining the necessary "maturity" needed to make the transition from the labor market to the classroom. I realize my work at the Institute was not the best, but it has been several years since I attended any schools. However, now as I look back, the Institute was the eye-opener I needed. Thank you."

"We plan to start a course in Industrial Electronics as a direct result of the training I received at your Institute."

"The Institute contributed to my knowledge of computer electronics and because of this I am directing my reading in this direction as well as trying to slant the electronics program more toward computer electronics."

"This program has provided me with a better knowledge of the emphasis being placed upon Industrial Electronics and to become aware of my strength and weaknesses within these categories. I am teaching General Electronics consisting of Radio-TV.SV. House Wiring."

IV. If you are teaching or supervising school programs, have you used information, practices, methods or ideas learned at the Institute in your assignment?

N	% of N	
20	87.0	Yes
1	4.3	No
2	8.7	No Answer

"The use of closed circuit television in teaching."

"Industrial electronics are included in my course outline content."

"Lesson plans and course outlines have been of much help."

"Used in lectures."

1. "By discussing and showing some of the uses for the principles of electronics, the students have stronger motivation for learning. This has been especially helpful in the study of Magnetism, and in Printed Circuit/Integrated Circuit Theory and application."

2. "The presentations dealing with the trends and equipment in Voc-Tech. Education are enabling me to do a better planning job for two new courses—Instrumentation and Radio-T.V."

"I am now teaching computer circuit and have added depth to my industrial electronics classes."

"Transistors--I have been able to start a program on the basic knowledge of electronics circuits."

"As a result of the Industrial Electronics training last summer we have revised our course in electronic technology almost completely to include methods I learned at the institute."

Computer Programming Introduction
Laser lecture and Demo.
Computer Fund. Math.
Electronic Technology in testing materials and X-ray
Industrial Instrumentation

1. Design and fabrication of transistors
2. Design and fabrication of printed circuit boards and equipment
3. Industrial control systems
4. Equipment standards (primary and secondary.)
5. Testing and evaluation procedures

1. Revised course outline
2. Lesson plans

"The masters for overhead transparencies, the course outlines have been used to update my own information. The laboratory experiences have been passed on to my classes. The Seminar material has been used time and again on class assignments for my college work, and also my students. The VICA program was started this year for our new school."

"Technical information that has applied to my teaching."

1. Computer construction and operation
2. Alarm systems
3. Standard lab procedures
4. Industrial control

"Pneumatic controls most useful in demonstrating control systems."

"Information gained, and materials which I prepared at the Institute, both being used in Course on Computer Technology."

"I have used much information obtained at Oak Ridge. A specific example in the pulse counter which I made in the laboratory. I previously had difficulty in getting a counter to work without skipping. I found that most of my trouble was in the input timing circuit which should produce a very short pulse."

"The information given to us on how to make transparencies has been very helpful to me in preparing my up-to-date course of study. I have also made changes in my course of study by using the ideas given to us by the instructors and by the other participants."

"I have used experience gained and instructional material obtained in printed circuit board fabrication, metal-shots, and integrated circuits."

"Preparation of assignments individually and in a group situation was of much value. Preparation of Transparencies was very important."

1. Micro Circuits and I.C.S.

V. Please comment on the aspects of the Institute that you felt were very worthwhile to you.

1. The workshops and Union Carbide lectures
2. The classes by Union Carbide and some morning sessions.
3. All

"The most worthwhile part of the Institute was the technical lectures."

"I feel that the field trips, and lecture demonstrations by the Oak Ridge staff in Y-12 were the most useful."

"The entire Institute was very valuable. Especially the printed materials (Transparencies, lesson plans, etc.) received, the Electronics lecture-lab sessions, the group discussion periods and the presentations(associates) and guidance sessions."

"Now that I have had time to digest this summers experiences, I have found every aspect very worthwhile."

"Guidance, technical information and shop practice—I would have enjoyed more time with the guidance department."

"Seminars where questions were discussed I personally gained confidence from the association with 100 people, that were interested in the same objective as I was."

1. Numerical control
2. Counseling
3. Seminars concerning all phases of vocational education, history, legislature and applications and its relation to federal departments."

Laboratory and shop work in the afternoon sessions

"As I have said, as you look back, all aspects of the Institute were helpful. The laboratory would have to be first in preference. The seminars were helpful as far as overall information is concerned, as well as the field trips. The information gathered from the sales people has helped me somewhat in making worthwhile contacts."

The laboratory and shop experience

Industrial electronics sensing and control system

"Not much"

"The Technical program in general"

1. Information on the latest state of the art
2. Seminars
3. Guidance and discussion sessions
4. Opportunity to learn what other instructors were using and doing

"Most of the field trips and lectures were very worthwhile. I believe I profitted most from the lectures on numerical control and computers.

My ideas of numerical control were completely wrong which the institute corrected."

"The ideas of the other participants have helped me very much such as: finding out about what educational materials are available from different companies and instructions on how to prepare the different types of instructional materials."

"The technical sessions, handled by Union Carbide, were very worthwhile to me."

1. The guidance program involving the association of others and their ideas in connection with their work
2. "The field trips were of utmost importance."

"Made me aware of the everchanging field of electronics, particularly in in the field of I.C.S. and transparency."

VI. Please comment on any aspect of the Institute that you feel could be improved and possibly make recommendations as to how the improvements could be implemented.

"Were it completely separated in the individual areas and the teaching more tailored to this group it would be more effective."

"More time could be spent in small group discussions and guidance."

1. "For this type of group, the planning lab tour could be more vocational-technical school oriented.
2. Vendors could be requested to present material for certain areas basic lab-instrumentation-future trends in equipment, etc.
3. More of the seminar and the Union Carbide. Material mimeographed for hand-outs. This would require less note taking and permit more coverage."

"I believe the lecture sessions from people from NEA, AVA, ECT, and salesmen could be made brief."

1. "Instructional materials--Too many of these were taken from textbooks. They should have been related to the material covered in our area."
2. "Too much time was taken by some of the companies that gave the workshops and demonstrations."

1. "Most of us thought the demonstrations and workshops in audio visual aids was too long."
2. "Lack of vendors to have enough hand out material and didn't follow through to send this material to us after the institute was over."
3. "Some of us felt that the vendor didn't know his product well or was talking to the wrong group."

"Morning work should include group work in related subjects, education subjects. Notebook projects should be all homework."

"I believe the time period could be cut to six weeks instead of eight. There seemed to be some mix-up of the sales personnel and I believe there were sometimes when their allotted time could have been cut, and more time given to the different classes, such as electronics for electronics people."

1. "Workshop sessions should be smaller groups."
2. "The seminars on AVA, legislation, etc. were too long. Could have covered the important parts in less time."

"Some of the outside vendors were not as prepared as they could be."

"The complete course for electronics should be overhauled."

"Scheduling of U.T. sessions was poor."
"More planning or coordination with vendor needed."
"Seminars of 100 frequently applicable to only 25 or 50."

"These need to be specifically aimed at each group."

"Vendors too frequently exhibited distinct lack of preparation for their sessions. This a reflection on their companies."

"I believe the lectures on electronics could be improved by handing out sheets with words and phrases listed so the student could concentrate on notes without having to wonder about correct spelling."

"I feel that many of the areas that we should have been able to see were restricted. I think a program of this type could be given better through a company that did not have so many restricted places. (Non-government companies)."

"I believe that the presentations by the various manufacturers representatives could be improved by better liaison. The representative should know more about his audience (size, background, fields of interest, etc.) and the facilities that will be available to him."

"It is believed that the program could have been improved by allowing more time for smaller group, especially those persons teaching similar subject matter. Also, an improved field trip with more field trips, and less restrictions, more shopwork."

1. Divide the work more in smaller groups.
2. Class work to laboratory work ratio of 60:40.

VII. Would you encourage another teacher to attend a similar Institute to the Institute you attended?

N	% of N	
17	74	Definitely Yes
6	26	Yes, with Reservations

Comments:

"I would like very much to attend another one myself."

"I believe there is a lot to gain by any teacher at the Institute. I only wish I could attend again to gain the things I thought trivial at the time."

VIII. Please rate the worthwhileness of the following University of Tennessee program categories as to how they contributed to your career growth.

A. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.

N	% of N	
11	47.85	Very Worthwhile
8	34.8	Worthwhile
3	13.0	Moderately Worthwhile
1	4.35	Of Little Value

B. Demonstrations and Workshops by 3 M, K & E, and others.

N	% of N	
4	17.35	Very Worthwhile
8	34.8	Worthwhile
10	43.5	Moderately Worthwhile
1	4.35	Of No Value

C. Field trips to Planning Laboratory and K-25 Computer Center

N	% of N	
14	60.9	Very Worthwhile
6	26.1	Worthwhile
3	13.0	Moderately Worthwhile

D. Guidance and Discussion Sessions.

N	% of N	
14	60.9	Very Worthwhile
6	26.1	Worthwhile
3	13.0	Moderately Worthwhile

E. Assignments as notebook, revised course outlines and transparency originals.

N	% of N	
12	52.2	Very Worthwhile
4	17.4	Worthwhile
4	17.4	Moderately Worthwhile
3	13.0	Of Little Value

F. Receiving a complete set of the developed instructional materials.

N	% of N	
10	43.5	Very Worthwhile
8	34.8	Worthwhile
3	13.0	Moderately Worthwhile
1	4.35	Of Little Value
1	4.35	Did Not Receive Set

Comments:

"Instructional materials could be more worthwhile if this part of the school was carried out as a group coordinated project."

"All of the above was worthwhile, especially the set of instructional material. I bound all eight sets. I am using the electronic material to revise my lesson sheets and as reference material. The other material I gave to the welding and machine shops which they seem to be using to advantage."

"I believe the Electronics Demonstrations should be for Electronics only, as some of the handout materials were never received by the Electronics people. I am sure this is the same for the other crafts also."

"The instructional materials should be in the skill technical area only and not all four areas."

a. "Sessions may have been too long."
b. "This is a fine idea but needs to have better guide-lines in which work is to be done."

"My sincere thanks for the materials in item F."

"F—especially valuable. Some of this material is outstanding."

IX. Please rate the worthwhileness of the following Union Carbide program categories as to how they contributed to your career growth.

A. Seminars in groups of 100 participants.

N	% of N	
6	26.1	Very Worthwhile
8	34.8	Worthwhile
7	30.4	Moderately Worthwhile
2	8.7	Of Little Value

B. Technical information lectures in the appointed areas.

N	% of N	
17	73.9	Very Worthwhile
5	21.75	Worthwhile
1	4.35	Moderately Worthwhile

C. Laboratory and/or shop practical experiences.

N	% of N	
17	73.9	Very Worthwhile
4	17.4	Worthwhile
1	4.35	Moderately Worthwhile
1	4.35	Of Little Value

Comments:

"A and B—These areas would be better if more hand-out material was included."

"They have enabled me to offer a 2 hr. course on computers. I have also received a whopping raise! Thanks."

"Group was too large. The institute was very enjoyable, the knowledge gained there will be of real value to me. I hope this will develop into a permanent training facility."

"I feel that anyone, regardless of what they may say, will benefit from such a program."

"There is no other comment to make about this, that I haven't already said. This portion of the Institute was very worthwhile. If there is anyway possible to return to the Institute I wish you would let me know, as I for one have learned a lot, and would like to return to further my education in a practical way along with my college work."

"In electronics there were 25 separate and non-related lesson plans—This could have been a very worthwhile project if a definite course outline had been followed; instead of each student going his own way and writing lesson plans, etc., on his own favorite subject."

"I would like for the Institute to provide more laboratory experiences."

"I would like to go again."

1. "Too many people in the group sessions (100)."
2. "Not enough material or equipment available for workshops."
3. "Did not have equipment available to work with in part of lab work."

"As a result of this Institute I have gained valuable experience in relating Industry's need for better trained people to my teaching profession. If it were possible to attend another institute, perhaps an advanced one of this nature I would be very happy to attend."

"In my opinion, this Institute was inferior to summer institutes funded by the National Science Foundation for Junior College and Technical Institute Faculty."

"Union Carbide and U.T. did a very good job."

MACHINE SHOP GROUP

Twenty-one of 25 participants (84 per cent) returned questionnaires.

All of the respondents indicated they were teaching in the area directly related to their Institute experience. Eighty-one per cent of those who returned questionnaires indicated they were in teaching directly related to the Institute experience for 100 per cent of their teaching time.

Over 80 per cent of the respondents indicated the experience was "valuable" to "very valuable" in their work. More than 95 per cent felt the Institute contributed to their career growth. Major categories of comments made relating to career growth are listed in order of frequency of comment. The percentage making reference to each comment is indicated.

1. Updating information on technical developments. (28.6%)
2. Credit hours for degree certificate and pay increases. (19.0%)
3. New teaching techniques. (9.5%)

Over 95 per cent of the participants indicated they were using information, practices, methods, and ideas learned at the Institute in their teaching. Many comments were made regarding improved teaching methods and changes to upgrade technical content. Two-thirds of the participants commented that they are including technological changes in their course of study and almost 60 per cent indicated they are using new teaching techniques.

When participants commented on aspects of the Institute that they felt were very worthwhile to them, the responses were about equally complimentary of both the Union Carbide and the University of Tennessee programs.

A non-programmed value, indicated by about a quarter of the respondents, was the exchange of ideas and association with teachers from many states.

Comments on aspects of the Institute participants felt could be improved were: (1) One third of the respondents stated the equipment in the shop needed attention. Some machines were in need of repair and more numerically controlled machines were needed; (2) About one quarter indicated improvement could be made in the use of company demonstrations for audio visual equipment; (3) About one quarter stated they desired more machine shop work experience working with a particular type of equipment; (4) Three of the twenty-one respondents noted that although technical lecturers knew their subjects well, their presentations were not well prepared.

About three quarters of the respondents indicated "definitely yes" when asked if they would encourage another teacher to attend a similar institute. Only one respondent indicated a "no, with reservations" to this question.

The participants were asked to rate the worth of the University of Tennessee program categories to career growth. The following list gives the order of perceived value with the percentage of the responding participants indicating these choices.

		Very Worthwhile	Worthwhile
(1)	Receiving a complete set of developed instructional materials	81.0%	4.75%
(2)	Assignments as notebook, revised course outlines, transparency originals	57.2%	33.3 %
(3)	Field trips to planning lab	38.1%	33.3 %
(4)	Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.	38.1%	28.6 %
(5)	Demonstrations and Workshops by 3M, K & E and others	28.6%	38.1 %
(6)	Guidance and Discussion Sessions	28.6%	38.1 %

The comments emphasized items 1 and 2 above as worthwhile aspects of the program.

Participants were asked to rate the worth of the Union Carbide program categories in career growth. The following list gives the order of perceived value with the percentage of the responding participants indicating the choices.

		Very Worthwhile	Worthwhile
(1)	Technical information lectures in the appointed areas	66.6%	28.6%
(2)	Laboratory and for shop practical experiences	42.8%	9.6%
(3)	Seminars in groups of 100	19.1%	42.8%

The most frequent comment relating to the Union Carbide program pertained to a need for more highly sophisticated machine tools to be operative.

The following tabulation indicates the responses to the various questions posed. When comments were made in response to a specific question, the quotations are stated as received.

I. How does your present employment relate to the skill-technical experience you received at the Institute?

N	% of N	
17	81.0	100 per cent of teaching time directly related
1	4.75	80 per cent of teaching time directly related--This teacher indicated 20% of time in indirectly related teaching.

N	% of N	
1	4.75	70 per cent of teaching time directly related--This teacher indicated 30% of time in indirectly related teaching.
1	4.75	25 per cent of teaching time directly related Remainder of time not specified.
1	4.75	Directly related teaching indicated but per cent of teaching time not indicated. This teacher indicated he was also employed outside of education in directly related work.

II. How valuable was the Institute experience to your work?

N	% of N	
8	38.1	very valuable
9	42.9	valuable
4	19.0	moderately valuable

III. Has the Institute contributed to your career?

N	% of N	
20	95.2	yes
1	4.8	no

Comments:

"It has made me realize how far behind our teaching techniques lag the technical developments. In this respect I am trying to develop new techniques in presenting updated information to the students."

"The hours I earned at the Institute will be of value toward a degree. The tips on trade secrets will be of help in teaching."

"Update information and material."

"The greatest contribution to my career development was in the knowledge I gained about vocational education on both the state and federal level."

"Certificate promotion which automatically carried a pay increase."

"Shown sophisticated types of equipment I would not normally have seen."

"In some areas."

"It has contributed to my development by allowing me brief exposure to materials, machines, and methods of today's technology."

"Gave me the chance to compare my program with others in other states."

"Knowledge, experience, credit hours."

"Experiences of value in visual aids and technical information pertaining to the machining field in general. Also the semester hours given were applied to my teachers certificate."

IV. If you are teaching or supervising school programs, have you used information, practices, methods or ideas learned at the Institute in your assignment?

N	% of N	
20	95.2	yes
1	4.8	no

Comments:

"I have incorporated several ideas into our program: 1. Film strips, 2. Video tape television, and 3. Many films."

"Some of the information that was gathered at the Institute on numerically controlled machines helps me to pass on to students more clearly the things that they will be exposed to in industry, even though I cannot give to them the actual experience due to not having such equipment."

"I used some of the lesson plans in math, especially the one about square roots, as a hand out sheet so the student could have an example of this. One trade secret, one of the instructors in the Institute told me about has stuck with me. That was how to figure the O.D. of a numbered tap."

"Have been using some of the information and materials from the Union Carbide lectures in my machine shop theory lectures and discussions. Am also making good use of the transparency originals."

"Since returning to my school I have put into operation a Cincinnati Tracer lathe. The information and practice I received on tracer equipment was very valuable in setting up and putting into operation this machine."

"The Superior Electric Company recently demonstrated a numerical control machine to my class. Information I received in the Institute was valuable to me in a post-demonstration discussion with my class."

"Used information in related subject area."

"By using drawings and diagrams to make transparencies, I persuaded my administrators to provide me with audio-visual equipment, which has improved my teaching and seemed to make it more effective."

"The transparency originals have proved to be a most beneficial aid and practically all of the information gathered in the Union Carbide lectures I have incorporated into my shop lectures."

"The use of closer tolerances and machining methods in projects made in the school shop."

"Transparencies and overhead projectors."

"By elaborating on machining techniques used to accomplish specific operations such as the elimination of the human element to achieve finishes to millionths of an inch."

"Lesson plans and note book is of great value."

"Being used in curriculum: Spherical turning, tracer lathe, and electric discharge machining."

"Teaching methods, machine operations setups."

"Use of transparencies in classroom. Knowledge and information gained in heat treating, gear cutting principles and other areas with which I have had limited experience."

"Methods of making course outlines, lesson plans, and visual aids of great value."

"Lesson plans-overhead projections and I can lecture from my notes taken at Y-12 over a broader area and in greater depth-I can now plan for a new program using the new innovations, machines and equipment demonstrated, I have already shown the film on eye safety-I am now a member of the AVA, I was not before as I did not know what the association actually did for vocational education. I intend to attend college every year."

"The course outline developed by myself. The transparency originals will be used during the second semester. The milling machine and lathe will be stressed. I have ordered the helium lamp and optical flats from Do-All to upgrade the measuring portion of my program."

V. Please comment on aspects of the Institute that you felt were very worthwhile to you.

"The Union Carbide lectures were most impressive and I have been able to use some of the information in my program."

"Course outline development, transparencies, talking with teachers within my field, a few of the seminars, and a few of the workshops."

"The exchange of ideas with other instructors in my field from such a large area, from such a diversified group as to purpose, probably was broadening. It goes without saying that it is definitely a help to be able to pursue a vocation when a stipend is provided, without the additional financial strain that such would cause a person with the income of an instructor."

"The most worthwhile thing about the Institute was the association with other instructors. The sessions with Union Carbide were very interesting in that we learned some of the processes used at U.C. Some tricks of the trade were learned from the machinist in the shop."

"Seminars were good in vocational education."

"The Union Carbide lectures-discussions and the group meetings were the most beneficial to me."

"Seminar with Dr. Childers. Seminar with A.V.A. representative. Group sessions in my technical area. I have used all information from the Union Carbide sessions in this school year. This information was a tremendous help to me."

"ERIC, NC."

"Demonstrations, lectures, laboratory sessions, and field trips, as well as exchange of ideas among instructors of the various states, provided us with added enthusiasm for the 1967-68 school session."

"The Union Carbide lectures, the notebook preparation, the work-shops that were related to my particular field (Pratt & Whitney, DoAll, etc.). More emphasis needs to be placed on this. Receiving the set of developed instructional materials."

"The technical information lectures were most interesting and informative. Group discussions were also informative."

"Related sessions on machining, brought out the latest developments and methods of machining materials."

"To a very limited degree the opportunity to witness some of the sophisticated equipment used in industry through films and by guided tours through some departments."

"Work shops-machine demonstrations."

"Exchange of ideas with colleagues-Insight into specialized machining techniques applied to precision manufacture. Opportunity to update personal machining skills."

"Laboratory and shop practice. The seminars with AVA, K&E, Pratt & Whitney. These were all good. The notebooks and the set of instructional materials I received from all groups."

"Knowledge gained through technical lectures and seminars by plant (Y-12) personnel were excellent."

"The seminars conducted by both UT and UC were of great value to me."

"Instruction in many areas all related to my field. The programs were set up to cover all areas including new ideas, machines, teaching visual-ed, psychology, the cooperation of the employees at the plant was great. The administrators did a great job. The college credit hours and the stipends were also an asset."

VI. Please comment on any aspect of the Institute that you feel could be improved and possibly make recommendations as to how the improvements could be implemented.

"The practical shop work should be improved as we did not have the opportunity to use an E.D.M. machine or a tape control machine. Definitely, this should be improved on Union Carbide's part."

"The quality of instruction for some of the Union Carbide classes needs to be improved. The afternoon work session in the machine shop could be done away with if you are not going to let the people use tape control machines, ECM, EDM, and other machines not generally found in the school shop. The demonstrations, (the two or three that we had) in the shop were very poor. It certainly would have made our summer more worthwhile if we could have seen more of the operations (tape machines, etc.) at the Union Carbide facility. There were several lectures being held in the drafting, welding and nondestructive testing areas that I could have greatly benefited from. These lectures should be made as an option to all areas that might be interested."

"More actual work experience should be provided. This cannot be accomplished in that industrial set up. It is doubtful if it could be accomplished in any industrial situation. What would be wrong with a school that gives training in specialized areas of a trade, taught by craftsmen of the trade, well trained salesmen of a product, technicians of industries, or any other personnel highly versed in the expertise of his profession? Augment the staff with teacher trainers from the universities. These institutions should be regional in organization and serve to train further, exceptional students that have graduated from vocational schools, for nine months of the year."

"I understand that in the 1966 Institute buses were provided to take the instructors where they had to go. This would have been of great (value) in 1967 because of so much rain and having to walk so far two and three times a day. Maybe a little more organization would help too."

"The company demonstrations could and should be arranged better. Too much time spent on overhead projector material (Pratt/Whitney representative and presentation was excellent.)"

"I feel too much time was devoted to visual aids. In one area representatives from DoAll and Pratt and Whitney spent two days each with our group. I feel that more companies should be invited to participate in the Institute. This would give the students more information on the latest equipment and manufacturing methods. Perhaps more time could be devoted to group discussions in each technical area. I personally received a lot of useful information from the group sessions that were held in our technical area."

"1. It is felt that the unit of instruction on lesson plans should be on a local level. 2. Note-taking and note-book retarded the learning process. 3. Machine tools and instructions were substandard."

"If it could possibly be arranged, to be able to see the equipment in production in the various plants."

"As mentioned in previous comments, I definitely feel that in the machining area in particular more emphasis needs to be given to the industrial type workshop. Not more time but a greater variety. The ones that were scheduled were fine, however they seemed to have a problem in constructively using their alloted time. The visual aids workshops by K & E, 3M, etc. were also fine but once again it seemed apparent that they not only endeavored to fill too much time but more coordination between them and the Institute personnel was indicated."

"More time spent in the precision machining section with methods and procedures and less time on history and development of vocational education."

"More time in the laboratory. Make equipment available and in operable condition to satisfy the group."

"Union Carbide Lecturers--Inasmuch as the lecturers knew their subject matter some were ill-at-ease while presenting their talk, while others were just not prepared to conduct a discussion. There were a few who were prepared and did present an interesting talk. It would enhance the program if select persons from specific areas were given an opportunity to gather material and properly assemble it for presentation even if it meant obtaining the cooperation of The University of Tennessee to train these people in public speaking. This is important if the audience is predominantly teachers who are accustomed to listening to educators and become critical of speakers who present an interesting topic in a boring manner.

"Time Spent in Fabrication Shop--I'm sure that the time spent in the machine shop was meant to bring to the attention of the participants the modern machines, methods and materials resulting from today's scientific advances. It was somewhat disappointing-to me at least-in that the machines I saw were of World War II vintage of which I was very familiar, having spent considerable time operating them during that period. Therefore, there was actually nothing of interest to me in the shop with the exception of one NC controlled drill press and one electric discharge machine which were inoperable during my stay at the plant.

It would have been invaluable to me to have been able to work out a problem involving a numerically controlled machine. This could have been a simple drilling operation of two or three holes where I would have had to program the sequence of operations, punch the cards, make the tape and finally see the machine performing the operations.

"Demonstrations and Workshops--Considerable time was spent by a number of companies presenting their equipment-which was educational-but the group was mainly from small school districts who could not afford the cost or justify its use due to limited amount of reproduction needed. I believe that this area could have been reduced to the showing of the latest development in visual aid equipment, possibly all at one day per company."

"Union Carbide did not deliver to course specification, did not have any late machine available."

"Expose public school vocational teachers to the training and teaching techniques of industry as conducted by the various plants. Take shop trips to industry to observe training and manufacturing."

"Field trips in the week; I myself seem to drop interest on these trips. With going home on my mind, with the trip ahead of me. Yes, these field trips should be during the week."

"1. Less time given to some vendors and have the vendors better briefed on the level of the group they are addressing.
2. Better cooperation and coordination between UT and Union Carbide personnel."

"The shop and lab sessions could have been more complete, (while at the time alloted at Y-12 last summer, UC was re-working the machine shop.)"

"More emphasis on course construction for a better coordinated two year high school course-complete with associated films, lesson plans, transparencies, roving specialists (on welding, casting, etc.) lecturing on related subjects, video tapes, vocational guidance material and counselors starting with bench work and progressing to tape control machine and production machines and set-ups."

VII. Would you encourage another teacher to attend a similar Institute to the Institute you attended?

N	% of N	
15	71.4	Definitely yes
5	24.8	Yes, with reservations
1	4.8	No, with reservations

VIII. Please rate the worth of the following University of Tennessee program categories to your career growth.

A. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.

N	% of N	
8	38.1	Very worthwhile
6	28.6	Worthwhile
5	23.8	Moderately worthwhile
2	9.5	Of little value

B. Demonstrations and Workshops by 3M, K&E, and others.

N	% of N	
6	28.6	Very worthwhile
8	38.1	Worthwhile
4	19.0	Moderately worthwhile
3	14.3	Of little value

C. Field trips to Planning Laboratory, K-25 Computer Center and ORNL

N	% of N	
8	38.1	Very worthwhile
7	33.3	Worthwhile
3	14.3	Moderately worthwhile
3	14.3	Of little value
0	0.0	Of no value

D. Guidance and Discussion Sessions

N	% of N	
6	28.6	Very worthwhile
8	38.1	Worthwhile
4	19.0	Moderately worthwhile
2	9.5	Of little value
1	4.8	Of no value

E. Assignments such as notebook, revised course outlines, transparency originals.

N	% of N	
12	57.2	Very worthwhile
7	33.3	Worthwhile
2	9.5	Of little value

F. Receiving a complete set of the developed instructional materials

N	% of N	
17	81.00	Very worthwhile
1	4.75	Worthwhile
2	9.50	Moderately worthwhile
1	4.75	Of little value

Comments:

"Sure would like to have the machine course outlines. It would help to make an evaluation of my own program."

"In section (F) above, (receiving set of instructional materials) the rating would most likely have been very worthwhile had all instructors been engaged in teaching at schools with the same objective."

"Any knowledge gained is helpful in my work. I gained some knowledge from each of the above categories which have been helpful in my teaching situation. While the field trip had little value it was an interesting experience."

"Only that I would like to emphasize items "E" and "F". (Assignments such as notebooks, revised course outlines, transparency originals. Receiving a complete set of the developed instructional materials.)

"Have all workshop demonstrators come fully prepared with adequate material and a planned lecture and demonstration."

"a. We were teachers not administrators. b. Too much time allowed for each group. c. Could be improved. D,E,F, very good."

"It would have been more interesting to have toured the shop areas of the University of Tennessee instead of planning laboratory."

"Audio-visual presentations took too much of time schedule. Would have enjoyed more time at the University of Tennessee Vocational Education Department and Shops."

IX. Please rate the worth of the following Union Carbide program categories to your career growth.

A. Seminars in groups of 100 participants

N	% of N	
4	19.1	Very worthwhile
9	42.8	Worthwhile
5	23.8	Moderately worthwhile
3	14.3	Of little value

B. Technical information lectures in the appointed areas

N	% of N	
14	66.6	Very worthwhile
6	28.6	Worthwhile
1	4.8	Moderately worthwhile

C. Laboratory and/or shop practical experiences

N	% of N	
9	42.8	Very worthwhile
2	9.6	Worthwhile
5	23.8	Moderately worthwhile
4	19.0	Of little value
1	4.8	Of no value

Comments:

"Was not organized. Obsolete equipment."

"Shop experiences should be planned to fit the equipment. Equipment for demonstrations should be in good operating condition."

"This area could be improved. (Laboratory and/or shop practical experiences.)"

"Could have been great, but the obsolete and worn out equipment was never in operation that we might gain the experience needed."

"Please consider comments expressed at item 7. (Aspects of the Institute you felt were very worthwhile.) There is a very definite need for such a school. Industry has a wealth of skilled craftsmen and technicians that would be available for short periods on the loan basis, and the institution being supported by more than one state and probably with federal assistance, would be the most financially desirable and possible and efficient of any type of institution of learning."

"Information I received in the technical information lectures have been a tremendous help to me in the new school year. Practical experience on the tracer lathe and technical information on tracing systems was very helpful to me in setting up and operating our new tracer lathe."

"The only reason that item "C" did not rate higher was due to the more highly sophisticated machine tools being out of order. For example, the numerical controlled machines and the electrical discharge machine. If these two items would have been working I definitely feel that it would have made this Very Worthwhile."

"Would like to spend more time in the precision machining areas."

"Much of the shop equipment we were interested in was not in operation."

"Would like to have seen actual production operation of N/C-ECM-EDM-tracer and computerized machining center."

JCH:jc
11/27/68

ATTACHMENT

TRAINING AND TECHNOLOGY
1967 IN-SERVICE SUMMER TEACHER INSTITUTE
FOLLOW-UP SURVEY

Directions: Please check the appropriate response and make comments in the spaces provided.

1. In which skill-technical area of the Institute were you appointed?

   Machining ☐ Electronics ☐ Drafting ☐ Welding-Physical Testing ☐

2. How does your present employment relate to the skill-technical experience you received at the Institute? I am working:

	Check all appropriate categories	Percent of time in each category
as a teacher, directly related to Institute experience.	☐	______
as a teacher, indirectly related to Institute experience.	☐	______
as a teacher, not related to Institute experience.	☐	______
as a school supervisor, directly related to Institute experience.	☐	______
as a school supervisor, indirectly related to Institute experience.	☐	______
as a school supervisor, not related to Institute experience.	☐	______
outside education, directly related to Institute experience.	☐	______
outside education, not related to Institute experience.	☐	______
I am not presently employed.	☐	______

3. How valuable was the Institute experience to your work?

   very valuable ☐ value ☐ moderately valuable ☐

   of little value ☐ of no value ☐

4. Has the institute contributed to your career development? yes ☐ no ☐

   Comments?

5. If you are teaching or supervising school programs, have you used information, practices, methods or ideas learned at the Institute in your assignment?

yes ☐ no ☐

If yes, will you please elaborate with some specific examples of what and how you applied them?

6. Please comment on the aspects of the Institute that you felt were very wothwhile to you.

7. Please comment on any aspect of the Institute that you feel could be improved and possibly make recommendations as to how the improvements could be implemented.

8. Would you encourage another teacher to attend a similar Institute to the Institute you attended?

definitely yes ☐ yes, with reservations ☐ no opinion ☐

no, with reservations ☐ definitely no ☐

9. Please rate the worthwhileness of the following University of Tennessee program categories as to how they contributed to your career growth.

	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
a. Seminars: Vocational-Technical Education, AVA, Legislation, ERIC, etc.					
b. Demonstrations and Workshops by 3 M, K & E, and others.					
c. Field trips to planning Laboratory K-25 Computer Center and ORNL.					
d. Guidance and Discussion Sessions.					
e. Assignments as notebook, revised course outlines transparency originals.					
f. Receiving a complete set of the developed instructorial materials.					

Any Comments?

10. Please rate the worthwhileness of the following Union Carbide program categories as to how they contributed to your career growth.

	VERY WORTHWHILE	WORTHWHILE	MODERATELY WORTHWHILE	OF LITTLE VALUE	OF NO VALUE
a. Seminars in groups of 100 participants.					
b. Technical information lectures in the appointed areas.					
c. Laboratory and/or shop practical experiences.					

Any Comments?

JCH:cy
1/16/68

Appendix E

Summary of Personal Data

1967-68 Pre-Service Institute Participants

PREFACE

The following report, prepared by Dr. D. E. Maurer, director of the Training and Technology Project's Vocational-Technical Teacher Institute, summarizes personal data on participants in the 1967-68 Pre-Service Institute. The data is based on a questionnaire distributed to the participants at the close of the academic year. A copy of the questionnaire is attached.

SUMMARY OF PERSONAL DATA OF CYCLE II PRE-SERVICE TEACHER PARTICIPANTS

Number of Students

Full-time: 19 classified as full-time who were recruited from sources other than local plant area. The 19 include only those who completed the full 9-month program.

Part-time: 21 classified as part-time who were, for the most part, recruited from local plant area. Some of these enrolled for only one 3 quarter hour course the entire second cycle while others carried as much as 12 quarter hours per quarter for 1 or more quarters, the minimum undergraduate enrollment requirement to be classified as full-time students. However, they were not classified as full-time students for the purpose of this tabulation, as all of them were employed full time at an industrial job and were taking the Institute courses as supplemental education. Four people who were recruited from out of state but who did not complete the full nine month Institute were also included in the part-time classification.

Age

Full-time - Age range 31-53, mean 45.9

Part-time - Age range, 25-52, mean 39.3

Residence before Coming to TAT

Full-time students:
1 Colorado
5 Florida
1 Hawaii
1 Illinois
1 Indiana
1 Kansas
1 Maine
1 Michigan
1 Missouri
1 New York
1 North Carolina
2 Tennessee
1 Texas
1 Virginia
Total States: 14

Part-time students:
1 California
1 Connecticut
1 Missouri
1 New Mexico
17 Tennessee
Total States: 5

Physical Defects

Full-time students: 1 each of the following; slight hearing deficiency, ulcers, glaucoma, diabetes, missing finger.

Part-time students: Gout, 1 man. All respondents with physical defects, when asked how these defects could effect their work as a teacher, indicated that they believed their defects would have no impairment of their effectiveness as teachers.

Highest Elementary - Secondary Grade Level Achieved

Full-time: 17 graduated from high school, by full-time attendance
2 high school graduates by GED, full-time schooling achieved were grades 8 and 10
19

Part-time: 13 graduated from high school, by full-time attendance
5 high school graduates by GED
18
3 not high school graduates
21

TABLE I

Achievement in Elementary-Secondary School

Grade	Achieved by Attendance		H. S. Graduate by Attendance		H. S. Graduate by G.E.D.		Total H. S. Graduates by Attendance & G.E.D.	
	FT	PT	FT	PT	FT	PT	FT	PT
7		1						
8	1	2						
9								
10	1	3						
11		2						
12	17	13	17	13	2	5	19	18
TOTALS	19	21	17	13	2	5	19	18

TABLE II

Last Year of Full-Time Attendance at Elementary-Secondary School

YEAR	FULL TIME	PART TIME
1930-34	4	1
1935-39	6	3
1940-44	4	3
1945-49	2	7
1950-54	1	4
1955-59	0	2
1960-64	0	1
TOTALS	17	21

The years the GED exams were taken were: Full time in 1951 and 1956; Part time in 1951, 52, 57, 61, and 68.

USAFI Courses

Only one student, a full-time participant, took U. S. Armed Forces Institute courses for college credit. He took 11 USAFI courses for a total of 49.5 quarter hours.

Training Courses While in Service

All 19 full-time personnel attended some type of formal military training programs while in the service. The total time spent in schooling ranged from 7 months to 75 months. The respondents were asked to divide their schooling into three categories: technical training related to area of appointment; technical non-related to appointment, and other.

Nineteen accumulated 218 months of training in a directly related technical area with a mean of 11.4 months and range of 1 to 50 months. Some of the men had their military training evaluated for college credit though others did not. The total hours of credit accumulated by such evaluation of the technical training was 284.5 quarter hours of work.

For non-related technical training, 13 men accumulated 131 months of education ranging from 2 to 28 months with a mean of 10.1 months; the total credit evaluation for this training was 84 quarter hours.

For "other" training, 10 full-time men accumulated 114 months of training for a mean of 11.4 and range of 1 to 28 months; 71 quarter hours of credit were given for this training.

Six part-time men acquired schooling while in the service ranging from 4 to 12 months with a mean of 7.1 years. In technical training related to their anticipated teaching specialty, 6 men accumulated a total of 43 months of schooling in period ranging from 4 to 10 months. For those who had their military training evaluated, a total of 25.5 quarter hours was awarded. One man attended a 2-month non-related technical program for which no college credit was awarded. One man attended an "other" category training program which was awarded 9 quarter hours of college credit.

None of the above quarter hours of work include the college credit given for military science and physical education reported later in this report.

College Courses Acquired as a Civilian

Fourteen of the part-time people attended college and earned 3 to 216 quarter hours of college credit with a mean of 65.2 hours.

One part-timer had a degree in journalism.

Four part-time people had enrolled in industrial education programs and one each in such curricula as agriculture, engineering, English, business speech, etc.

Except for one person who had enrolled in college in 1936, the remainder had attended college from the late 1940's to the present.

Fifteen of the 19 full-time people attended college and had earned from 3 to 198 quarter hours of college credit prior to enrollment in the Institute with a mean of 75.8 hours.

Three had earned baccalaureate degrees, one each in the following major curricula: BA in liberal arts, BA in history, and BS in general education.

Two had enrolled in industrial education and one each in such curricula as philosophy, business administration, forestry, mining engineering, physical science, etc.

Though several had acquired this college credit in the late 1930's and early 1940's, most had enrolled for college work during the 1950-60 decade.

Civilian Training

Twelve had acquired special non-credit civilian training in technical, business and vocational schools and programs ranging in length from 2 months to 4 years. Two were enrolled in the 1930's, 2 in the 1940's, 6 in the 1950's and 2 in the 1960's.

The courses or training area in which they were enrolled were auto mechanics (2), radio-TV and electronics (3), mechanical drafting, machine shop, business management, and one man who took training in three fields - business law, aeronautical science and mathematics.

Physical Education and Military Science Credits

The University of Tennessee allows physical education and military science credit for full-time service in the various branches of the military. Six part-time people received such credit, all with 6 quarter hours in physical education and 6 hours in military science. Seventeen of the 19 full-time people received from 2 to 12 quarter hours in physical education and from 6 to 28.5 quarter hours of military science. Several full-time people did not have their military service evaluated for physical education or military science credit as they either had degrees or had acquired such credits at other colleges or universities.

Technical Proficiency Examinations

The University of Tennessee, Industrial Education Department, offers proficiency examinations in various technical fields such as electronics, machining, welding, etc. Eleven part-time people and 12 full-time people elected to take the proficiency examinations.

Examination	Credit Hours	Passed PT	Passed FT	Total
3010 - Related Science, Mathematics, and Technology in Occupations	9	11	11	22
3020 - Manipulative Skills in Occupations	9	11	11	22
3030 - Knowledge of Related Subjects in Occupations and Personal Qualifications	9	11	12	23
Total	27 hours			

Date Enrolled in Institute

The quarter and year when first enrolled in the Pre-service program of the Institute is as follows:

Part-time		Full-time	
2	Fall Quarter, 1966	19	Fall Quarter, 1967
6	Winter Quarter, 1967		
1	Spring Quarter, 1967		
6	Fall Quarter, 1967		
0	Winter Quarter, 1968		
6	Spring Quarter, 1968		
21	Total		

TABLE III

QUARTER HOURS OF COLLEGE CREDIT AND CLASSIFICATION PRIOR TO ENROLLMENT AT THE INSTITUTE

Credit Hours	Classification	Number Full Time	Number Part Time
0	Freshman	2	7
0-22	Freshman	1	5
23-45	Freshman	3	2
46-70	Sophomore	2	3
71-95	Sophomore	0	1
96-120	Junior	1	1
121-145	Junior	4	0
146-170	Senior	2	0
171-200	Senior	4	2
TOTAL		19	21

Excluding those with no credit the full-time people had a mean of 99.2 and range of 3-198 quarter hours.

Excluding those with no credit the part-time people had a mean of 67.9 and range of 3-183 quarter hours.

Supplemental Courses Taken During Enrollment Period

Some persons supplemented their educational program at the Institute by taking U. T. Correspondence courses, extension courses in the Oak Ridge U. T. Evening School program, and on the main university campus.

Of the part-time people, 3 have taken courses at the Oak Ridge Evening School (1 with 6 quarter hours and 2 with 3 quarter hours each) and one at the main campus for a total of 9 quarter hours.

Of the full-time people, 7 people took supplemental coursework. Three men took one 3-hour course by correspondence and one 3-hour evening school course at the Oak Ridge Center. One man took 6 hours and another man 3 hours by correspondence. Another man took a three-hour course at the Oak Ridge Center and one man took 6 hours on the main campus.

Hours Accumulated at the Institute

The total number of quarter hours taken at the Institute at Y-12 by the part-time people was 534 hours with a mean of 25.4 and range of 3 to 54 hours. The total hours accumulated by the full-time people was 999 with a mean of 52.5 and range of 45 to 60 hours.

TABLE IV

QUARTER HOURS OF COLLEGE CREDIT AND CLASSIFICATION AT THE END OF PRE-SERVICE INSTITUTE, JUNE 1968

CREDIT HOURS	CLASSICATION	Number Part Time	Full Time
0-22	Freshman	5	
23-45	Freshman	2	
46-70	Sophomore	4	
71-95	Sophomore	2	4
96-120	Junior	3	3
121-145	Junior	1	1
146-170	Senior	1	2
171-200	Senior	2	2
201-Up	Senior	1	7
TOTAL		21	19

TABLE V

QUARTER AND YEAR WHEN PARTICIPANTS EXPECT TO GRADUATE WITH A BACCALAUREATE IN INDUSTRIAL EDUCATION

Quarter	Year	FT	PT	Quarter	Year	FT	PT
Spring	1968	3	0	Spring	1971	0	0
Summer	1968	3	0	Summer	1971	0	0
Fall	1968	3	1	Fall	1971	1	1
Winter	1969	1	0	Winter	1972	0	0
Spring	1969	1	0	Spring	1972	0	3
Summer	1969	2	0	Summer	1972	0	0
Fall	1969	0	0	Winter	1972	0	0
Winter	1970	1	1	Other			0
Spring	1970	1	3		1975	0	1
Summer	1970	0	0		1978	0	1
Fall	1970	0	0		1980	0	1
Winter	1971	0	0	Don't Know	-	3	9
				TOTALS		19	21

Three full-time people were graduated from the University of Tennessee Spring Quarter 1968 at the end of the second cycle of the Pre-Service Institute. Ten more full-time people expect to graduate with 1 to 4 additional quarters of work and thus may be expected to be available for placement as vocational technical teachers within a year, i.e., by Fall 1969. Three do not know when or if they expect to graduate.

Within the next five years, i.e., by Spring 1973, 11 part-time people expect to earn baccalaureate degrees in industrial education. Nine do not know when or if they will continue on to receive an undergraduate degree.

When asked if and where they may plan to obtain a B.S. degree from some other institution, two of the full-time people who "didn't know" when and if they expected to graduate indicated they probably would continue their education at the University of Tampa and Florida Technological University. One of the part-time people indicated he intended to attend the University of New Mexico. No other part or full-time participants indicated that they expected to obtain baccalaureate degrees at other institutions.

Future Plans of Students

The responses of each full-time and part-time participant as to his short range (SR) and long range (LR) plans: (Each is identified by his name.)

Full-time Participants

Hannibal Combs - SR, Teaching in Kansas City, Missouri school system; LR, Same

Jimmie Frady - SR, Teaching; LR, B.S. degree and teaching career, working in industry each summer.

Joe Hackney - SR, If I can get the necessary funds, I plan to continue schooling; LR, I plan to teach in Tennessee.

Ralph Hall - SR, Teaching; LR, Teaching, Southeast, Southwest.

Frank Harper - SR, Continue School; LR, Teaching.

Charles Jones - SR, Work and/or teaching this fall; LR, I expect to remain in this area, possibly I hope to continue schooling at U. T.

Robert Logue - SR, I plan to continue my studies at U. T. during the summer and fall to get B. S. degree in December. Start work on masters program in fall quarter; LR, To continue in graduate work at U. T. until I obtain my masters degree. My plans after that are to remain in east Tennessee area and teach in vocational field.

Joseph Mannion - SR, School; LR, Keesler Air Force Base, Mississippi, as teacher.

Warren F. Merrey - SR, Work during summer; LR, Either teach in Jacksonville, (Florida) secondary school or attend college in Tampa.

Clarence Merwin - SR, Summer, B.S., Fall, Masters - Doctoral; LR, Ph.D. in philosophy or theology.

Arthur Morgan - SR, Pursue graduate program to M.S. in industrial education at U. T. Teaching, summer (68), then return in fall quarter; LR, vocational-technical teacher as electronics instructor in secondary or post secondary schools, northern great plains preferred.

Barney Myers - SR, Continue at U. T. through the summer; LR, Continue full time at U. T. through the M. S. degree then seek employment at junior college level in the general area of the Mississippi Valley.

Ernest Priest - SR, Teach during summer at Flatwoods Job Corps Conservation Center; LR, Teach at the Wise County, (Virginia), Vocational-Technical School.

Matt Reiser - SR, Graduate school 1968 (summer) to 1969 (fall). Teach vocational education 1969-71 or 72. Administration in 1972; LR, Administrator of vocational schools in Florida.

Merrill Sanders - SR, Teach during fall or do graduate work at U. T.; LR, Teach in high school.

Julius Schrader - SR, U. T. to complete degree (B.S.); LR, Fellowship at University of Missouri (2 year).

Robert Van Kleef - SR, Schooling; LR, Teaching in junior college or high school in East Tennessee.

John Velin - SR, Attend U. T. this fall if possible. If a good offer comes along, as to teaching in a vocational Institute I will cut the U. T. plans and go and teach, then attend a college or University in the local area; LR, obtain a degree in education and a teaching career around Orlando, Florida.

Robert Whipple - SR, Have applied for civil service position as teacher of electronics; LR, Teaching in Orlando, Florida.

Part-time Participants (including all full-time Carbide employees)

Thomas Avera - SR, Work and teach at TAT in Y-12; LR, Work at Union Carbide or teach vocational education.

Warren Cartwright - ST, Working at Carbide and attend school part-time; LR, Same.

Richard Dew - SR, Continue working and part-time schooling; LR, Work and possibly teach in the southeast.

James Echols - SR, Continue working at present job; LR, Continue in either TAT employment or newspaper work in southeast.

Roscoe Fields - SR, Work at Y-12, school part-time; LR, None.

Robert Gouldy - No response.

William Fraley - SR, Work; LR, Work and continue schooling until graduation, and then probably teach.

Roger Hattrup - SR, Continue teaching at Oneida and continue schooling on part-time basis; LR, Continue teaching career in Tennessee.

Alvin Lay - SR, Work and schooling; LR, Career plans and schooling in Tennessee. (Has since taken full-time teaching job.)

Earl Leek - SR, Obtain employment; LR - Unknown.

James May - SR, Continue working at Carbide and go to night school; LR, Same.

Joseph Miller - SR, Continuation in present position; LR, Completion of education including Master's degree and teaching or administrative work in vocational education.

Charles Lyons - SR, Work for Union Carbide; LR, Teach in this area.

Billy Myers - SR, Work, school part-time; LR, Complete B.S., probably go into teaching.

James Nickell - SR, More formal education, part-time; LR, Aim is a B.S. in industrial education again pursued on a part-time basis.

Harley Orange - SR, Teaching machine shop in night school first part-time, then full-time; LR, Teaching in Tennessee.

Richard Paige - SR, Obtain industrial job until Fall 1968; LR, obtain teaching position in Pennsylvania.

Roy Russell - SR, School part-time at U. T., work full-time; LR, Continue schooling for B. S. in teaching. Would like to teach in California.

Jimmie Smith - SR, Work at Y-12; LR, Same.

Irving Stolet - SR, Obtain industrial job until finding a teaching position in the field of welding; LR, Obtain teaching position and attend college to obtain B. S. degree in Industrial Education.

Thomas White - SR, Schooling at U. T.; LR, B. S. degree, teach in Southeast. (Has since enrolled at U. T. to complete degree.)

The families of 10 full-time participants lived out-of-state during the institute and 9 moved their families to the local area. Seventeen of the 21 part-time people were from the local area prior to and during their enrollment at the institute. The remaining four part-time men were out-of-state people who came to the institute in the Fall of 1967 to attend full time but dropped after one to two quarters of attendance. Three had left their families at their home state and one, who is now teaching in Oneida, Tennessee, had moved his family to the local area when he first enrolled.

Sources of Income of Participants

See Tables VI and VII.

Previous Teaching Experience

Seven full-time people had prior civilian teaching experience with a mean of 2.4 years and a range from 4 months to 4 years. Five of the part-time participants had civilian teaching experience ranging from 1 to 3 years with a mean of 2.5 years.

Fourteen of the full time pre-service teachers had previous teaching experience while in the service. The average length of the teaching experience was 5.4 years with a range of 6 months to 14.5 years. Only two part-time people had acquired any military teaching experience; one taught 7 1/2 years and the other 3 years.

Formal On-Job-Training

Three full-time men served full apprenticeships to qualify as journeymen machinists or tool makers; one of these men served a combination 7 1/2 year apprenticeship to qualify first as a machine repairman and then as a toolmaker. All three were appointed to the machining area. Thirteen part-time people had acquired civilian on-the-job training ranging from 3 months to 6 years for a mean of 3.6 years. Eleven served machining apprentice training and hold journeyman status; three of the machinists completed additional training in related fields, one undertook a one-year program as a planner-estimator for machining jobs, one a three-year program for millwright and the third is presently taking a N/C programming in-plant training course. The remaining two of the 13 men who received OJT are primarily draftsmen but who have taken N/C programming training on company time.

Civilian Technical Work Experience

Two of the 19 full-time people did not acquire any civilian work experience; the remaining men accumulated a total of 107 years of civilian work experience associated with the technical area in which they were appointed, for an average of 6.3 years and a range of 9 months to 15 years. All except 3 had worked in their technical area during the 1960's; the exceptions worked last in their specialties in 1942, 1946 and 1949. Twenty of the part-time men acquired a total of 254 years of civilian work experience related to their technical field for a mean of 12.7 years and range of 1 to 28 years. All 20 had worked (or were presently working) in the technical area during the 1960's. One man had acquired no applicable work experience.

Non-Technical Civilian Work Experience

In non-technical civilian work, 8 full-time people accumulated an average of 4.1 years of experience in such fields as park attendant, farming, gas station

TABLE VI

SOURCES OF INCOME UTILIZED TO SUSTAIN THE NINETEEN FULL-TIME PARTICIPANTS AND FAMILIES DURING THE ACADEMIC YEAR OF THE INSTITUTE

	Per Cent																			No. Respon-ses	% by No. of Respon-ses	% by All 19 Respon-dents
Military Retirement	15	33	49	15	70	60	25	70	35	38	35	40	-	50	70	60	50	60	70	18	47	44.5
GI Regular	-	50	51	75	30	40	30	-	15	17	20	30	-	17	-	30	50	40	25	15	34.6	27.4
GI Rehabilitation	85	-	-	-	-	-	-	30	-	-	-	-	-	-	30	-	-	-	-	3	48.3	7.6
Part-time Work - Self	-	5	-	-	-	-	5	-	-	3	5	-	20	-	-	-	-	-	5	6	7.1	2.3
Full-time Work - Self	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spouse Work	-	-	-	-	-	-	40	-	50	20	20	-	40	20	-	10	-	-	-	7	29.9	10.5
Savings	-	12	-	10	-	-	-	-	-	22	20	30	-	13	-	-	-	-	-	6	18	5.6
Other	-	-	-	-	-	-	-	-	-	-	-	-	*40	-	-	-	-	-	-	1	40	2.1
																					Total	100.0

*Civil Service Annuity

TABLE VII

SOURCES OF INCOME UTILIZED TO SUSTAIN THE TWENTY-ONE PART-TIME PARTICIPANTS AND FAMILIES WHILE ENROLLED AT THE INSTITUTE

																						No. Respon-ses	% by No. of Respon-ses	% by All 21 Respon dents
Military Retirement	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	40	-	-	30	-	3	3.6	5.3
GI Regular	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	20	-	-	20	1	4	22.7	4.3
GI Rehabilitation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Part-time Work - Self	-	-	-	-	-	-	-	33.3	-	10	-	-	-	-	-	-	-	-	-	-	-	2	21.7	2.1
Full-time Work - Self	100	100	100	100	100	100	100	-	100	-	100	70	100	60	100	100	-	100	100	20	64	18	89.6	76.8
Spouse	-	-	-	-	-	-	-	33.3	-	-	-	-	-	40	-	-	40	-	-	30	35	5	35.6	8.5
Savings	-	-	-	-	-	-	-	33.3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	33.3	1.6
Other	-	-	-	-	-	-	-	-	-	-	-	*30	-	-	-	-	-	-	-	-	-	1	30.0	1.4
																							Total	100.0

*Business Income

attendant, truck driver, auto mechanic, etc. Ten part-time people had worked an average of 6.1 years in such occupations as produce clerk, tool crib attendant, newsman, upholsterer, real estate salesman, etc.

Related Military Experience

Sixteen of the 19 full-time men accumulated a total of 223 years of military technical experience related to their technical area of appointment; this work ranged from 3 to 27 years with a mean of 13.9 years. Three full-time men, though accumulating some technical military work experience, had not acquired work directly related to their appointed field of study at the institute. Fourteen men had technical military experience during the 1960's; the remaining two had acquired their work during the 1940's and early 1950's.

Only six of the part-time people had acquired technical work experience related to their technical field of instruction while in the military service. They acquired a total of 30 years, with a mean of 5 and range of .5 to 18 years. Most of this work was acquired during the 1940's and 1950's.

Unrelated Military Experience

Seventeen of the 19 full-time men accumulated work experience not related to their technical area of appointment at the institute totaling 175 years with a mean of 10.3 and range of 2 to 23.5 years. Their experience included such work as in administration, radar mechanics, civil engineering, logistics, supply officer, artillery unit commander, flight instructor, command pilot, etc. Seven of the 21 part-time people acquired 27 years of indirectly or non-related military experience as battery officer, aircraft mechanic, radar operator, etc. The mean was 3.8 years with a range of 1 1/2 to 11 years.

Attachment

Pre-Service Teacher
Information Form

I. GENERAL

1. Name ____________________

2. Local Address ____________________

3. Age (Sept. 1967) __________ Telephone ____________________

4. Permanent Address of self or person who will know your address at all times:

____

____

____

5. State where living before coming to the Institute ______________

6. Physical Defects: ____________________

How will any physical defect affect your work as a teacher of your particular technical specialty?

____

____

II. EDUCATION

7. Highest elementary-secondary grade level achieved:

1 2 3 4 5 6 7 8 9 10 11 12

8. If you graduated from high school, give the year _________

9. If you took the high school level GED test, give the year _________

10. List any USAFI courses you took for college credit:

TITLE OF COURSE	QTR. HRS.	YEAR

Military

11. List all technical training related to the area to which you were appointed:

GENERAL TITLE	DESCRIPTION OF COURSE	DATES ATTENDED	LENGTH OF TRAINING	QTR. HRS. EVAL.	QTR. HRS. APPL. BS	QTR. HRS. USED BS

Military

12. List all technical training which is not related to the area to which you were appointed:

GENERAL TITLE	DESCRIPTION OF COURSE	DATES ATTENDED	LENGTH OF TRAINING	QTR. HRS. EVAL.	QTR. HRS. APPL. BS	QTR. HRS. USED BS

Military

13. List all other training not related to the area to which you were appointed:

GENERAL TITLE	DESCRIPTION OF COURSE	DATES ATTENDED	LENGTH OF TRAINING	QTR. HRS. EVAL.	QTR. HRS. APPL. BS	QTR. HRS. USED BS

14. List the college level work you have acquired as a civilian:

NAME OF SCHOOL	DATES ATTENDED	TOTAL QTR. HRS.	DEGREE	COURSES AND/OR MAJOR FIELDS

15. List any special civilian training you have received (vocational, technical and business schools, correspondence courses, etc.)

NAME OF INSTITUTION CITY & STATE	DATES ATTENDED	NO. OF CREDITS OR TIME LENGTH	TYPE OF CERTIFICATE	NAME OF COURSE OR TRNG. AREA.

16. How many quarter hours of credit have you received for military service for:
Physical Education _____ Military Science _____

17. Did you take the proficiency examination in your technical area on campus?
Yes _____ No _____

18. Check the part(s) of the proficiency examination(s) which you successfully completed?

_____ 3010 (written) 9 qtr. hrs.

_____ 3020 (performance) 9 qtr. hrs.

_____ 3030 (oral) 9 qtr. hrs.

19. When did you first enroll at the Institute? Quarter _____ Year _____

20. How many quarter hours of college credit had you already acquired prior to your first enrollment at the Institute? Qtr. Hrs.____ Classification_________

21. Since the day you first enrolled at the Institute, list any course you have taken or are taking by correspondence, U. T. Evening School in Oak Ridge, and/or on the main campus:

COURSE NUMBER	COURSE TITLE	QTR. HRS.	WHERE TAKEN

22. Total hours accumulated at the Institute at Y-12 from first enrollment in the Pre-Service program: Qtr. Hrs. ______

23. Total quarter hours accumulated as of June 9, 1968, including college credit received for military experience and training, correspondence (UT, USAFI, other), courses taken at the Y-12 Plant and on campus, and prior college work accumulated elsewhere:

Item	TYPE	TOTAL QTR. HRS.	TOTAL APPLICABLE TO B.S. DEGREE
10	USAFI		
11	Military, Technical related		
12	Military, Technical unrelated		
13	Military, Other, general		
14	College, (other than U. T.)		
15	Special Civilian Training		
16	Military, Physical Education		
16	Military, Military Science		
18	U. T. Proficiency		
21	U. T. Correspondence		
21	U. T. Evening School		
21	U. T. Main Campus		
22	Pre-Service Institute		
	TOTAL		

24. What will be your classification at the end of this quarter?
(Freshman, Sophomore, Junior, Senior, Graduate) ____________________

25. If you plan to complete the B. S. degree at U. T., indicate when you will graduate: Quarter __________ Year _________

26. If you plan to complete the B. S. degree at another institution, where do you plan to enroll and when do you expect to graduate?

Institution____

Graduation Date: Month _______________ Year ________

27. What are your future immediate short range plans? (schooling, work, teaching, etc.)

28. What are your future long range plans? (schooling, teaching or work career plans, where you want to locate geographically, etc.)

29. Where is your family geographically located at the present time?

____

30. What sources of income were utilized to sustain you and your family for the academic year spent at the Institute? Give percentages of total income.

Per Cent

_______ Military Retirement Salary
_______ GI Bill - regular
_______ GI Bill - rehabilitation
_______ Part-time work by self
_______ Full-time work by self
_______ Spouse was working
_______ Savings
_______ Other: (specify) ____________________________

_______ TOTAL

III. WORK EXPERIENCE

TEACHING

31. How many years and months of civilian teaching experience have you acquired? (Do not include student teaching.) _____Years _____Months

32. How many years and months of military teaching experience have you acquired? _____Years _____Months

LEARNING

33. How many years and months of formal civilian on-the-job training (such as apprenticeship) have you acquired? _____Years _____Months

Tech. Area	Dates	Trng. Comp. Yes/No	Job Class. at Comp.	Nature of Training

Other explanatory remarks: ____________________________

____

34. Star (*) all above training which is directly applicable to the technical area to which you are appointed.

CIVILIAN

35. List any civilian work experience you have acquired in technical or industrial pursuits. Note: Accumulate all "like" experiences:

DESCRIPTION OF WORK	TOTAL NO. OF MONTHS & YEARS	DATES OF PERIOD WHEN MAJOR PORTION OF EXP. WAS ACQUIRED

36. Star (*) all above work which is directly applicable to the technical area you are appointed.

37. List any other civilian work experience you have acquired by accumulating "like" experiences:

DESCRIPTION OF WORK	TOTAL NO. OF MONTHS & YEARS	DATES OF PERIOD WHEN MAJOR PORTION OF EXP. WAS ACQUIRED

38. Star (*) all above work which is indirectly applicable to the technical area to which you were appointed.

MILITARY

39. List any military work experience you have acquired as a technician or craftsman. Accumulate all similar experiences:

DESCRIPTION OF WORK	TOTAL NO. OF MONTHS & YEARS	DATES OF PERIOD WHEN MAJOR PORTION OF EXP. WAS ACQUIRED

40. Star (*) all above work which is directly applicable to the technical area you are appointed.

41. List any other military work experience you have acquired. Accumulate all similar experiences:

DESCRIPTION OF WORK	TOTAL NO. OF MONTHS & YEARS	DATES OF PERIOD WHEN MAJOR PORTION OF EXP. WAS ACQUIRED

42. Star (*) all above work which is indirectly applicable to the technical area you were appointed.

43. You have had a wide variety of experiences in the past nine months. In what ways do you think you may have changed - ideas, goals, values, etc.? In other words, in what ways do you think you are different now than you were last September? What do you think were some of the factors which brought about these changes?

APPENDIX F

CURRICULUM DESCRIPTION
PRE-SERVICE INSTITUTES
1966-67 and 1967-68

The following are capsule descriptions of the education and technical courses conducted in the 1966-67 and 1967-68 Pre-Service Vocational-Technical Institutes.

The education courses were conducted by regular members of the University of Tennessee faculty, some of whom were assigned full-time to the Training and Technology Project and others who came to the project site from the main university campus in Knoxville specifically to teach one or two courses.

The technical courses were taught by personnel of Union Carbide Corporation-Nuclear Division. All of the technical courses except Numerical Control provided laboratory or shop applications in addition to lectures. The technical courses described here are part of a large number of technical offerings approved by the University of Tennessee Senate in the Spring of 1967 for the University's Industrial Education curriculum.

Education Courses
(University of Tennessee Staff)

History and Philosophy of Education (3)—3010 Kermit J. Blank

The course consisted of lectures and discussion on the development of education and its philosophy from the early Greeks to the 20th Century. Instruction units included Early Greek philosophical thought, Christian impact on philosophy and education, Rousseau and Naturalism, 19th Century Revolutions, and such 20th century philosophers and educators as Dewey, Goodman, McLuhan, Jourard, and Rafferty.

Principles and Organization of Education (3)—3020 Thomas N. Johnston

The course stressed principles and organization of education in relation to current educational problems and practices; organizational patterns; financing of public education; and professionalization of teaching.

Social Foundations and Curriculum (3)—3030 Robert Howard

Topics included culture and society and their influences on curriculum; principles, problems, and procedures of subject matter selection; sequence, grade placement and time allotment; curriculum issues; state curriculum policies and practices; and understanding curriculum trends through the use of behavioral sciences.

Educational Psychology: Adolescent (3)—3810 Gerald K. LaBorde

The course covered the developmental theories of Erickson and Ausbel as the basic text and incorporated theories of other developmental psychologists, such as Freud, Mourer, Juny, etc., for discussion and comparison. The history of the development of learning theory also was outlined. The course was intended to provide the prospective teacher with a knowledge of developmental patterns of individuals from infancy through adulthood, with major emphasis on the adolescent and early adult years. Developmental stages were associated with classroom behavior and behavioral problems. An individual case study was required of each student. Trainees in the TAT worker training program volunteered as subjects. These furnished ideal case-study material because they were typical of the students the prospective teachers would encounter later.

Basic Experiences in Trade and Industrial Education (3,3,3,)—2010-20-30

D. E. Maurer
T. E. Powell

Students were assigned individual problems designed to meet their needs and to complement and supplement their regular program of studies. The course was used in the institute to provide credit to students who were working full-time in their particular specialty.

Related Science, Mathematics, and Technology in Occupations (9)—3010
Manipulative Skills in Occupations (9)—3020
Knowledge of Related Subjects in Occupations and Personal Occupations (9)—3030

The University of Tennessee Department of Industrial Education offers college credit by proficiency examination for 27 quarter hours in various trade specialties. Presently the department has examinations in electricity, electronics, drafting, welding, machine shop, and RN nursing. Only people with considerable experience in their trade or technology are advised to enroll for the special trade-technical examination, which consist of three parts: (1) 3010 (9 quarter hours), a written examination on the technical aspects of the trade or technical specialty; (2) 3020 (9 quarter hours), a manipulative examination requiring the student to perform several operations or tasks to demonstrate his ability; and (3) 3030 (9 quarter hours), an oral examination covering a wide range of topics related to the technical specialty. All examinations are conducted by a panel made up of university staff, teachers of the occupation, and personnel from industry who are specialists in the area in which the examination is given.

History and Philosophy of Industrial Education (3)—3110

D. E. Maurer

The course explored the historical and philosophical foundations of industrial education with emphasis on their effect on present patterns of organization and problems, issues, and trends in industrial-technical education.

Shop Organization and Management (3)—3310

Donald D. Riggs

The course included methods of planning and organizing new shops and reorganizing existing shops; principles of management for most effective use of time in classroom and shop; appreciation of planning in providing for development of skills, knowledge, and attitudes; and a comprehensive system for maintaining data on students and on industrial needs for effective placement.

Materials and Methods for Teaching Shop and Related Subjects (3)—3320
J. O. Nicholson

The course provided prospective teachers with knowledge of the types and uses of teaching aids and placed special emphasis on development and construction of aids to meet the needs of the individual instructor.

Foremanship Training by the Conference Method (3)—4110 Donald D. Riggs

Students learned procedures, problems, methods, and types of conferences and all had an opportunity to develop and lead a 1½-hour conference with other class members as participants.

Job Analysis (3)—4120 J. O. Nicholson

The course consisted of principles of job analysis for the purpose of listing teaching content in trade and industrial education. It included practice in analyzing jobs for production, auxiliary, and related technical content and covered instructional difficulties and progression factors.

Methods of Teaching Shop and Related Subjects (3)—4210 J. O. Nicholson

The course included principles of the student-teacher relationship in a learning situation; methods of organizing and planning lessons utilizing principles of learning and teaching; and applications of various methods and techniques in teaching vocational classes.

Curriculum Building in Trade and Industrial Subjects (3)—4310
J. O. Nicholson

The course consisted of arrangement of course material and preparation of checking sheets and individual instruction sheets in trade and related subjects.

Problems in Industrial Education (3,3,3)—4350-60-70 D. E. Maurer
T. E. Powell

This problems course was used to supplement the programs of registered students. No formal classes were held. Students met with the instructor, decided on a project, and met periodically with the instructor during development of the project. The projects varied with indivudual needs and interests. One student elected to construct an integrated packet of written instructional materials and overhead transparencies applicable to his teaching assignment. Another delved into various supplementary readings related to his industrial-education professional coursework and discussed them with his instructor orally and in written reports.

Directed Teaching—4110-20 Donald D. Riggs

The courses gave practical teaching experience in laboratory and lecture situations and experience in the preparation of outlines, lesson plans, and information and assignment sheets. Course 4410 was for 6 quarter hours of credit requiring 60 hours of work, and Course 4420 was for 9 hours of credit requiring 90 hours of work. The pupils, in most cases, were trainees in the TAT worker training program.

Technical Courses
(Union Carbide Staff)

Physical Testing Technology (3,3,3)—3040-41-42

George Burton
Benny Houser
T. D. Cabe

The course was designed to prepare prospective teachers in quality control, materials evaluation, and radiography laboratory work. The major units of instruction included radiography, evaluation of welds to standards, evaluating materials, evaluating fabricated assemblies, processing film, operation of radiation detection equipment, and operation of densitometers.

Welding, Brazing, Cutting, and Related Processes (3,3,3)—3050-51-52

E. N. Rogers
Kenneth Lewis
B. G. Cross
Herman Wyrick

The training developed skills adequate for certification in a number of welding processes, including arc welding, oxyacetylene welding and cutting, tungsten arc inert gas welding, and metal arc inert gas welding. Classroom theory was provided in addition to individual welding practice.

Industrial Mechanical Technology (3,3,3)—3070-71-72

B. G. Myers

The course was designed to upgrade and update personnel with previous drafting background. It was conducted as a problem course with typical industrial design and detail projects being assigned. Integrated with the projects were modern industrial techniques such as true position dimensioning and microfilming practices. Grading was accomplished similar to industrial checking practice for this type of work.

Electronics Technology (3,3,3)—3060-61-62

Jim R. Smith

The course was designed to provide students with knowledge of the theory and operation of a wide variety of industrial instruments, including Wheatstone bridges and recorders, thermocouples and potentiometer circuits, pneumatics, vacuum systems, transistors, oscilloscopes, X-rays, laser beams, and metal photo and printed circuit boards. For each unit, a specialist from the Y-12 Plant assisted in the instruction.

Industrial Mechanical Instrumentation (3,3,3)—4060-61-62

Jim R. Smith
Bob G. Roe

The course was designed to provide the students with knowledge of the principles and operation of numerical control type computers for use on large metal working machines. The Mark Century Numerical Control Computer was studies in detail. In the latter section, a term paper was required on

"A Comprehensive Study and Block Level Analysis of the Mark Century Computer Contouring Control System."

Numerical Control (3)—4090 B. G. Myers

The course introduced prospective vocational teachers to basic concepts and elementary programming techniques for numerically controlled machine tools. Emphasis was on practical applications of programming. Units of instruction included numerical control and its impact on drafting technology; genesis of numerical control; manufacturing functions under n/c; positioning control systems; machine tools and their relationship to n/c; manual programming; and computer assisted programming.

Machine of Metals (3,3,3)—3080-81-82 Richard Dew

The course was designed as an introduction to industrial machine-shop theory and procedures, stressing information and practice on the use of basic machine tools. Topics covered included shop procedures, safety, precision measurement, construction of the engine lathe, and operation of the engine lathe, shaper, milling machine, drill, and grinder and saw.

Industrial Materials (3,3)—4080-81 Richard Dew
William C. Fraley

This was an advanced course in machining practices and processes. It included lecture and practical experience in such areas as numerical control, machining, the tracer lathe, and electro-discharge machining.

Appendix G

Content (exit) Survey

1967-68 Pre-Service Institute

PREFACE

The following report consists of a summary of responses of participants in the Training and Technology Project's 1967-68 Pre-Service Vocational-Technical Teacher Institute to a questionnaire distributed to them near the end of the program asking for their reactions to the various segments of the institute. A copy of the questionnaire is attached. The questionnaire and report were prepared by John C. Hamel, TAT experimentation and training coordinator.

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Summary

Thirty-six pre-service participants returned questionnaires out of the possible 40 full-time and part-time students. Of the 36 returns, 21 were full-time students and 15 were part-time students.

Responses were made on a five point scale from "very good" to "very poor." Ratings of general aspects of the program by the total group ranged from "very good" to "average" as the participants experienced them in preparation to become vocational-technical teachers. Orientation was given the highest rating with educational advisement rating a very close second.

Two general aspects that were commented on several times by the participants in relation to their ratings were: (1) Lack of adequate study facilities (four comments), and (2) Poor condition and/or lack of sufficient equipment (five comments).

Statements about the most helpful University of Tennessee experiences indicated several high points in order of frequency. They were: psychological understanding (five comments), University of Tennessee staff members (four comments), practice teaching (three comments), and methods courses (three comments).

Personnel and use of machines were noted as high points when commenting on the most helpful Union Carbide program aspects.

Forty-two course offerings were evaluated by the students attending the institute. Average of the group ratings were all in the "very worthwhile" and "worthwhile" categories. No courses received group ratings of "moderately worthwhile," of "little value," or of "no value." Most of the comments about courses taken were very favorable. One course, IE4110, Foremanship Training, which the class rated as "worthwhile," received several constructive comments. Eleven courses received a perfect score rating by participants of the class.

Suggestions for improving the program or comments of instances of "little value" were varied and did not catagorize easily for a summary statement.

The general tone of the survey indicated the participants were very satisfied with the institute experience.

General Aspects

During the last month of the Institute, pre-service teacher participants were requested to rate several aspects of the program. Responses were made on a five point scale, from very good to very poor. A variety of experiences were rated, ranging from general physical facilities to specific courses attended. For additional clarification of the ratings participants were encouraged to write comments.

The average rating of all the participants of the general aspects of the program were as shown in the following table. The numerical values used to average the responses were:

Very good	5
Good	4
Average	3
Poor	2
Very poor	1

Average Responses To General Aspects Of The Program

N = 36

Orientation	4.53
Classroom facilities	3.60
Shop or laboratory facilities	3.80
Study facilities	2.93
Guidance (counseling and testing)	4.14
Educational advisement	4.45
U. T. General Seminars	4.13

The average responses by various groups of the general aspects of the program are shown.

Average Responses To General Aspects

Drafting Group

N = 4

Orientation	4.0
Classroom facilities	4.0
Shop or laboratory facilities	3.75
Study facilities	2.67
Guidance (counseling and testing)	4.0
Educational advisement	5.0
U. T. General Seminars	4.0

Comments:

"I was enrolled in only one course which was presented in the lunchroom during construction."

Shop or laboratory facilities - "Drafting machines were old and worn out."

Study facilities - "No study facilities."

Guidance - "No guidance; counseling was good but there was no goal explained and no variable approaches. This was because of the unscheduled classes in the latter quarters. I personally gained more from the changes in the course but I could have gotten more if I knew prior to the winter quarter just what was ahead."

The following comments were stated as the most helpful experiences received as a prospective teacher, in the University of Tennessee part of the program.

"The practice teaching with involvement in actual classroom situations and with typical T & I students."

"Very good instruction."

"I feel that I became more proficient in identifying students with problems that might prove detrimental to their progress in the classroom."

"Interest and desire demonstrated by all the instructors and the help given to me."

Participants were requested to name the most helpful experience(s) received as a prospective teacher in the Union Carbide part of the program. Their statements are:

> "Each prospective pupil has to be guided as an individual and requires individual instruction."

> "I developed the know how and the confidence to teach to a greater degree."

Suggestions for improving the University of Tennessee portion of the program are:

> "The help received from the staff was beyond that which was required of them. Dr. Maurer is the cause of my continuation in schooling and I hope to be able to get a degree in education."

> "Keep program at Union Carbide."

> "In general the U. T. portion of the program is better than those classes which I have taken on the campus."

Suggestions for improving the Union Carbide portion of the program are:

> "My training was made easier and more profitable by the advice and guidance of Mr. Nicholson and Mr. Myers. Mr. Nicholson didn't have to aid me in as many projects and problems as he did."

> "Offer more courses."

Average Responses To General Aspects

Electronics Group

N = 12

Orientation	4.58
Classroom facilities	2.92
Shop or laboratory facilities	3.25
Study facilities	2.18
Guidance (counseling and testing)	4.25
Educational advisement	4.42
U. T. General Seminars	4.45

Comments:

"Could have used some mock-ups as visual and practical aids."

"Dr. Maurer heading the program often went out of his way to be helpful to the students."

"Inability to control heat and ventilation in some rooms was biggest deficiency in the class rooms. Laboratory equipment was excellent in most cases--facilities poor. I would like to make one comment on what I consider the weakest part of the program--applicant selection, especially in the electronic section. There was an extremely large gap in the background of the students. It was obvious that several were extremely weak in this particular field. Some were not even well founded in the basic Ohm's law theory. I hope I am incorrect but I feel that if these few individuals attempt to instruct in this field the students will suffer."

Shop or laboratory facilities — "90% of the laboratory was conducted on a conference table with very little equipment."

"Realizing the experimental nature of this project, and that sufficient time and energy could not have been devoted toward better classroom and laboratory facilities is my only reason for not being able to consider them in the very good category."

Orientation — "Indicated stress on becoming a laboratory or shop instructor. In my understanding and conviction, a teacher is not an instructor -- an instructor is not a teacher. It is my purpose to teach, not instruct!"

Shop or laboratory facilities —"In particular, laboratory facilities -- not enough -- too many people have to use -- or only observe -- the one or other few pieces of test and other equipment."

Study facilities —"Actually, there are none unless an usused room may be found."

"Library and study facilities were non-existent. Shop facilities were unrealistic in terms of basic goals as I understand them (actual industrial experience). Electronic lab facilities were not conducive to teaching. Insufficient in quantity and time spent in use."

"Classrooms need to have acoustical tile or other type of echo reduction material. Study facilities were nonexistant per se."

The following comments were stated as the most helpful experiences received as a prospective teacher, in the University of Tennessee part of the program.

"Curriculum Building -- Directed Teaching -- Methods -- Job Analysis"

"The untiring efforts of Dr. Maurer, Mr. LaBorde and Mr. Nicholson and later Mr. Riggs on behalf of the participants of this program. It is a result of their activities that I, and others I have talked with, have decided to pursue our education further."

"I feel that those courses that were concerned with the Philosophy, Psychology and the Public School systems were of most value to me. I feel these courses, perhaps, will make me a little more tolerant and understanding of the less fortunate elements of our society."

"I was impressed with the whole U. T. program except IE 4110."

"Aid, assistance and recognition received, in passing Proficiency Examinations. Knowledge gained from Educational Courses that were taught."

"Three are immediately obvious -- Adolescent Psychology 3810, History and Philosophy of Education, 3010, and Social Foundations and Curriculum 3030. A very close second to these however is Principles and Organization of Education, 3020."

"Every experience was equally highly valuable."

"Mechanical Drafting Experience"

"They have all been helpful and will be of value to me."

"Exploring the 'system' e.g. How the schools operate, a true unpolished representation of how the schools are. I especially appreciated the field trips taken in shop organization and management. I learned more in those two trips than the rest of the course."

Comments about experiences in the University of Tennessee part of the program that were of little value for a prospective teacher are as follows:

"No complaint"

"All through the program the "busy work" that you are sent home to type up. Most all of the assigned homework was useless trivia designed simply as a discipline for an adolescent student."

"IE 4110 was a complete waste of time -- It would be good for high school seniors."

"The only course I can possibly suggest as being of little value is the shop organization and management course 3310. While being worthwhile, most vocational technical prospective teachers have organized and managed shops for many years. Other educational programs would seem more worthwhile."

"4410 & 4420: Previous experience as teacher made this course less meaningful than otherwise. 4120: Had previously taken analysis and curriculum building as single semester course but could credit only one by transfer. 4110: Could be very meaningful (Poorly Conducted). 3310: Could be very meaningful (Poorly Conducted)."

"Foremanship training by the conference method. Military personnel should automatically be given credit for the course, this time could then be devoted to the technical fields that we all are so hungry for. 'Get out the garbage and get in the goodies.' "

Participants were requested to name the most helpful experience(s) received as a prospective teacher in the Union Carbide part of the program. Their statements are:

"Directed teaching -- but was not helped too much."

"Lectures by the engineers and scientists."

"Teaching electronics and learning to machine metals."

"Working with Boolean Algebra and learning the Photo Metal process."

"How not to conduct an educational class -- Union Carbide teachers should receive some professional education training before given the responsibility at teaching."

"Directed Teaching. Knowledge gained in Electronics."

"In the Industrial Electronics and Instrumentation part -- Numerical control equipment and its associated equipment, plus the knowledge of the various pneumatic and electronic instrumentation equipment utilized industrially, of which I had no previous knowledge of its existence."

"Every experience was equally highly valuable."

"3060-61-62: Too much simple theory -- Not enough actual equipment work experience: Some theory coverage of industrial instruments was outstanding. 4060-61: Computer technology new experience to me."

"Electronics"

"Once again the electronic section was always pushing us to get the maximum from the students. (I liked that.) Always cheerful and helpful at any time. The orientation tour through the electronics instrumentation building."

Comments about experiences in the Union Carbide part of the program that were of little value for a prospective teacher are as follows:

> "Basic electronics included in beginning of the program."
>
> "Block diagramming only, and the uses of the various blocks of numerical control equipment seem to be of least value if I am to adequately teach the functions (and maintenance) of such equipment. The amount of time which could be devoted to maintenance particularly was naturally impossible under the program."
>
> "How not to conduct an educational class -- Union Carbide teachers should receive some professional education training before given the responsibility at teaching."
>
> "Except for some of the guest lectures, the first quarter of Electronics had little value. There was no sequence in the program. Most lab experiments were performed before the theory was developed in class. Much of the theory, when presented, was done by Mr. Morgan, a member of our own class."

Suggestions for improving the University of Tennessee portion of program are:

> "Get a determination on the collection of extra 'fees' when attending classes of credit at the high school (U. T. night classes)."
>
> "Give the student an opportunity to credit courses by experience in I. E. General Courses as well as in one's major area or specialty. Universities are very quick to admit that learning can take place outside their classrooms but they are just as quick to deny a student credit for it. In order that he might more realistically satisfy his needs, it seems that mature students could be given more latitude if these experience credits could be granted.
>
> So far as my particular requirements are concerned as established by University of Tennessee catalog, this Institute was almost perfectly matched with the needs which I held upon entry to progress toward BS I. E. requirements. I am not convinced that the courses required by University of Tennessee or any other university are necessarily in consonance with the actual needs of the mature tradesman who is entering the teaching profession. In my opinion it is a fallacy to think that any two individuals are alike in these needs yet we require each student to follow the same track whether he be 25 or 65 years of age, experienced as a teacher, or not.
>
> The Vocational-Technical teacher is made an initial hiring offer in terms of two things, his experience and the scarcity of his talent, but his upper limit of salary is almost always dictated by his academic progress in college. I feel that this fact has prevented many outstanding tradesmen from entering the teaching profession. He cannot hope to recover his tradesman's salary until he cumulates a master's degree and his hopes of compiling the number of hours for it are very small indeed. Vocational schools hire tradesmen without teaching experience or degree and they are usually successful in their new job, yet if that same tradesman-teacher, after ten years' teaching experience elects to enter a University to pursue a degree program he will be required to take identically the same courses as one who has neither taught nor been a tradesman. I am not here advocating the gift of a degree or college credit to anyone but the point I am advancing is that programs (BS) for mature tradesmen-teachers should be tailored to the individual.

In addition I would like to advance the idea (not new) of internship arrangement which would combine college credit with teaching experience rather than the so-called directed teaching courses which seem satisfactory for as far as they go which isn't very far."

"Moderate the continuously indicated stress on the student becoming an instructor. There is a difference and I have had to adopt several units of instruction -- presented as material for instructors -- to fulfill the pertinent and necessary prerequisites of teaching. It is my aim to teach and, if I am fortunate enough to become a teacher, I will take offense at being called an instructor. Throughout this course of study I have taken, and do take offense at mentions, and indications verbally expressed, as well as reproduced formats to be used, that my efforts will result in being an instructor. Hopefully, my efforts will help me to become an efficient, valuable teacher."

"Only by offering more of the Psychology of teaching. Not being aware of the many possibilities available, it would be presumptuous on my part to suggest specific courses, but I am firmly convinced that Mr. Jerry LaBorde would be far more capable than I in this. I have been thoroughly convinced that unless we can completely understand our students -- how can we possibly expect to teach them?"

"Recognition and more help from the higher echelons, of the College of Education (on campus).

"Need more material to work with in IE 3320."

"The prepackaged assignment sheets used in some courses were too obsolete -- asking questions and referring to pages in old text books no longer in use. Many of these assignments I felt were "busy work" and their value was limited."

"Yes, there should be some mathematics courses available instead of all the boring educational theory courses."

"Better facilities would help. More classrooms to improve scheduling."

"More individual attention."

Suggestions for improving the Union Carbide portion of the program are:

"Allow the prospective teacher to get "Live Work Experience" it seems to me that is the basic advantage of the industrial setting for the program."

"Moderate the continuously indicated stress on the student becoming an instructor. There is a difference and I have had to adopt several units of instruction -- presented as material for instructors -- to fulfill the pertinent and necessary prerequisites of teaching. It is my aim to teach and, if I am fortunate enough to become a teacher, I will take offense at being called an instructor. Throughout this course of study I have taken, and do take offense at mentions, and indications verbally expressed, as well as reproduced formats to be used, that my efforts will result in being an instructor. Hopefully, my efforts will help me to become an efficient, valuable teacher."

"Union Carbide personnel have been for the greatest part thoroughly experienced in their fields. It would help however if they had a modicum of teacher training before placing them before a bunch of students. Surely, we know that they know their fields, expertly -- however in a few cases I have personally observed, they did not know how to transmit this knowledge to a classroom of students. This should not be taken as a condemnation in the slightest manner. They are only masters of their field, who automatically assume that the student understands the verbal, plus the non-verbal part of the course being presented -- and -- being human, leave out many parts of the things that have become so basic to him, feels that each participant should have first understood prior to being presented to the course.

On the whole, the instruction for the prospective, Vocational-Technical teacher at this program seems to have been master-minded very successfully. I am so very proud to have been one of the 23 chosen to attend this initial, and hopefully, one of the many yet to come. The most current needs of industry seem to have been supplied for this instant. Without adequate follow-up with continuous upgrading, according to industrial needs of programs of this type, then I do feel that perhaps we may have missed one of the greatest opportunities available to us today."

"Develop more interest in the program."

"Better use of lab facilities would be a great aid. Most of our lab work was not too meaningful and was conducted in the classroom."

"The electronic instructors were not experienced in teaching their subject."

"Better screening of Union Carbide instructor personnel. There are several who claim to be 'handcuffed volunteers' and reflect this attitude. They may not admit this to the boss, but their students know, and are affected by it."

"By the use of more learned personnel as instructors."

Average Responses To General Aspects

Machining Group

N = 16

Orientation	4.54
Classroom facilities	4.13
Shop or laboratory facilities	4.17
Study facilities	3.58
Guidance (counseling and testing)	4.17
Educational advisement	4.33
U. T. General Seminars	3.89

Comments:

"Semi precision and hand tools unavailable."

Shop or laboratory facilities -- "In the machining area, the tool crib operation, and the lack of tools necessary to accomplish the job at hand left much to be desired, and caused apathy and a feeling of 'what's the use.' This statement is not in reference to the machines that were available."

Study facilities --"I feel that there were no study facilities available at the institute. The lack of these areas made research, and study inconvenient, and time consuming."

The following comments were stated as the most helpful experiences received as a prospective teacher, in the University of Tennessee part of the program.

"Opportunity to observe shop teaching in a typical trade school atmosphere. Informal atmosphere and friendly association with staff."

"The most helpful experiences for me at the institute, have been in directed teaching, methods of teaching shop and related subjects, and educational psychology."

"This is the greatest thing that has happened to me."

"The most helpful experience was having instructors like Dr. Donald E. Maurer and J. O. Nicholson. I was highly motivated by their leadership and interest in education and students."

"Drafting"

"A belief in me by Dr. D. E. Maurer. Knowledge of Dr. Blank's philosophy. Knowledge of Dr. Howard's philosophy."

"The field trips were most helpful."

"Educational Psychology (3810)."

"Visual Aids."

"The methods and visual aids course were very useful to me and I particularly gained from the combined efforts from industry and education. I think I gained very much even from their sometimes lack of agreement and cooperation on the part of both."

"The whole experience gave me an opportunity to develop my long-standing interest in the teaching field, as a fascinating and rewarding profession. As a prospective teacher I naturally look forward to this as an additional source of income."

"To better see the working organization of the school systems."

"I am a machinist and feel this will help me considerably."

Comments about experiences in the University of Tennessee part of the program that were of little value for a prospective teacher are as follows:

"Because the requirements to gain entry into the institute were of a specific nature, lab time in machining of metals was of no value. I believe it could have been, if a little more planning and thought had been put into this area by those responsible."

"Little evaluation was in the directed teaching."

"IE 3310 -- IE 3320 -- IE 4120 -- IE 4210 -- IE 4310 -- Challenges the intellect as a kiddy car would a race car driver. IE 4110 was for the uninitiated."

"This is a very fine program, I feel that it would be good if more industries and universities had similar educational programs."

Participants were requested to name the most helpful experience(s) received as a prospective teacher in the Union Carbide part of the program. Their statements are:

"Excellent assistance furnished by supervisors and shop personnel."

"I commend Union Carbide for putting at our disposal the up-to-date machines and equipment. I do feel, however, that the lack of administration, and planning in the machining of metals area did not encompass these machines. Machining of metals was too basic in view of the requirements to enter the programs."

"Very helpful to know industry and U. T. are working together."

"Machining of metals. Numerical control."

"Use of the machines."

"The regular employees were most helpful and cooperative."

"Visual aides."

"Was unable to use their part in anything other than their facilities for practice teaching but I gained much through the combined services of the two programs as I saw the functioning of the two combined."

"Seeing these students preparing to make their contribution to the working world."

"To be better qualified to perform a teaching job."

Comments about experiences in the Union Carbide part of the program that were of little value for a prospective teacher are as follows:

"Machining of metals (3080-81-82) should have been better organized with course outline and guidance."

"Major loss of time trying to find proper tools to work with. Disinterest of some foremen; their ineptness."

"I commend Union Carbide for putting at our disposal the up-to-date machines and equipment. I do feel, however, that the lack of administration, and planning in the machining of metals area did not encompass these machines. Machining of metals was too basic in view of the requirements to enter the program."

Suggestions for improving the University of Tennessee portion of the program are:

"Yes, short lectures to impart the salient points of those courses IE 3310, IE 3320, IE 4120, IE 4210, IE 4310 and substitution of intelligent curricula, that is advantageous."

"From my experience I can see none, however, all things can be improved."

"In my opinion the U. T. portion of the program was satisfactory."

"Orientate it more to the situation as the instructors will find it in many of the schools and industrial setting instead of the rosy ideal situation which we so seldom find. Emphasize more the fact that the future teacher can only teach according to his trade ability no matter how many methods courses he covers."

"To give more assistance in planning curriculum and tests."

"By expanding the program to include other fields."

Suggestions for improving the Union Carbide portion of the program are:

"By expansion of the program."

"Have a better understanding of their function in the program so that they might better use their vast experiences in better preparing the teacher. Their lack of control over their part of the program handicapped them very much in trying to bring the trade experiences of the teachers up to date in many fields."

"Help Union Carbide employees who desire to further their education."

"We, as prospective teachers are told by U. T. that no credit for our trade experience can be given. However, Union Carbide has tradesmen as teachers in their part of the program, without any training as teachers. University of Maryland will allow their teachers to go in industry for the summer months to gain credit for their trade experience."

"Available interested foremen. Available varied machine set-ups."

Average Responses To General Aspects

Welding-Physical Testing

N = 1

Orientation	5
Classroom facilities	4
Shop or laboratory facilities	5
Study facilities	2
Guidance (counseling and testing)	2
Educational advisement	4
U. T. General Seminars	3

Comment:

> "Suggest that a clear cut 'chain of authority' be delineated in the total program."

The following comments were stated as the most helpful experiences received as a prospective teacher, in the University of Tennessee part of the program.

> "Guidance and personal counseling by the Institute Director, Dr. Maurer."

Comments about experiences in the University of Tennessee part of the program that were of little value for a prospective teacher are as follows:

> "Counseling and testing, performed by the staff charged with this responsibility, was cooperative, however, their work did not result in any value to myself, as a prospective teacher."

Participants were requested to name the most helpful experience(s) received as a prospective teacher in the Union Carbide part of the program. Their statements are:

> "The cooperative attitude of 'mature' instructors made our learning and working situation an agreeable experience."

Comments about experiences in the Union Carbide part of the program that were of little value for a prospective teacher are as follows:

> "Introduction to Physical Testing was made approximately five weeks 'after' a class had started, which made it extremely difficult to absorb this complex subject. Time spent 'catching up' was frustrating. Schedules should be re-arranged to start students at beginning of a class."

Suggestions for improving the University of Tennessee portion of program are:

> "Schedules should be rearranged 'specifically' for this group of select people, so as to utilize their time -- without lag time between classes."

Suggestions for improving the Union Carbide portion of the program are:

> "Union Carbide instructors should not be changed 'during' the program. Emphasis must be given at the 'start' of each program to stabilize them for the full period of the program."

The average rating of the courses by the students who attended each course are shown in the following table. The ratings indicate the perceived value of the course in preparation to become a Vocational-Technical teacher.

The numerical values used to average the responses are:

Very worthwhile	5
Worthwhile	4
Moderately worthwhile	3
Of little value	2
Of no value	1

Course Number	Course Title	Average Rating	N
3010	History & Philosophy of Education	4.58	26
3020	Principles & Organization of Education	4.63	19
3030	Social Foundations & Curriculum	4.55	20
3810	Educational Psychology: Adolescence	4.87	23
2010	Basic Experiences in T&I Education	4.43	7
2020	Basic Experiences in T&I Education	4.43	7
2030	Basic Experiences in T & I Education	4.38	8
3040	Physical Testing Technology	5.00	1
3041	Physical Testing Technology	5.00	1
3050	Welding Brazing, Cutting & Rel. Processes (U.C.)	4.68	3
3050	Welding Brazing, Cutting & Rel. Processes (Stolet)	4.80	10
3051	Welding Brazing, Cutting & Rel. Processes	5.00	1
3060	Electronic Technology	4.18	11
3061	Electronic Technology	4.18	11
3062	Electronic Technology	4.18	11
3070	Industrial Mechanical Technology (U.C.)	4.40	5
3071	Industrial Mechanical Technology (U.C.)	4.67	3
3072	Industrial Mechanical Technology (U.C.)	4.75	4
3070	Industrial Mechanical Technology (Velin)	5.00	10
3071	Industrial Mechanical Technology (Velin)	4.70	10

Course Number	Course Title	Average Rating	N
3072	Industrial Mechanical Technology (Velin)	4.67	9
3080	Machining of Metals (U.C.)	3.67	6
3081	Machining of Metals (U.C.)	3.67	6
3082	Machining of Metals (U.C.)	3.67	6
3080	Machining of Metals (Frady)	5.00	5
3081	Machining of Metals (Frady)	5.00	2
3082	Machining of Metals (Frady)	5.00	1
3110	History & Philosophy of Ind. Education	4.54	28
3310	Shop Organization and Management	4.22	23
3320	Mtls. & Meth. for Teach. of Shop & Rel. Subjects	4.44	18
4060	Industrial Electronics Instrumentation	5.00	8
4061	Industrial Electronics Instrumentation	5.00	8
4062	Industrial Electronics Instrumentation	5.00	3
4080	Ind. Mtls., Processes & Fabrication of Metals (U.C.)	5.00	1
4080	Ind. Mtls., Processes & Fab. of Metals (Fraley)	4.50	2
4090	Numerical Control	4.20	15
4110	Foremanship Training by Conference Method	3.85	13
4120	Job Analysis	4.44	25
4210	Methods of Teaching Shop & Related Subjects	4.53	17
4310	Curriculum Building in T&I Subjects	4.52	21
4410	Directed Teaching	4.39	23
4420	Directed Teaching	4.50	12

Comments on Industrial Education Courses:

"These are required courses for a degree. I considered it a privilege to have the opportunity to take them."

"Directed Teaching -- very little evaluation was made."

"Very good courses."

"These courses were great. We should have more of the same."

"I think the curriculum was well designed, however, more emphasis could have been placed on the actual teaching situation. I make this comment in view of the years of experience in management, organization, and leadership possessed by the participants of this program."

"I found the courses very relevant to our particular field and think the industrial setting added much to the learning. I think the straight academic field could gain much from these experiences due to the fact that when going into employment a person meets such and the sudden adjustment is sometimes never achieved at all much less easily. I gained much insight and understanding in particular from Mr. Powell and his vast experiences in both industry and education."

"Very informative. They seem to lean more to the practical side."

"The shortage of industrial education instructors is more pronounced in post high school courses. The curriculum could be strengthened by presenting courses with more technical content particularly in mathematics and the physical sciences."

"Instructors were well qualified and did a good job. It's the best I've had in many years."

"I appreciated the instructors from U. T. campus coming to Y-12 to give classes. The personnel in Electronics did an outstanding job and should be commended. With support such as theirs any program could be a success. They covered a broad field yet let us as students get our 'feet wet' for we were not onlookers -- but do'ers! Training aid sources should be available for student teachers. What did the Union Carbide teachers use for training aids? Science cannot be taught to MDTA students just looking at an inappropriate text."

4410 & 4420 "Previous experience as teacher made this course less meaningful than otherwise." 4120: "Had previously taken analysis & curriculum building as single semester course but could credit only one by transfer." 4110: "Could be very meaningful (poorly conducted)." 3310: "Could be very meaningful (poorly conducted)." 3070-71-72: "Outstanding in terms of shop teacher needs." 3060-61-62: "Too much simple theory -- not enough actual equipment work experience: Some theory coverage of industrial instruments was outstanding.

"Courses were generally considered to be those necessary to prepare a beginning teacher adequately. The cooperation between the University of Tennessee, Industry (Union Carbide) and the U. S. Government, is a unique experience and much consideration should be given toward continuance of this type program. If we are to have an adequate supply of Vocational-Technical teachers, I consider this type program the closest approach to solution of the problem yet developed."

"Courses were well presented. Knowledge gained from taking these courses, will help me considerably as an instructor."

"Course 4090, the instructor tried to put too much into the course and as the result I didn't learn much about anything."

"The courses are marked as to whether or not they were worthwhile to me and not on course content. Those areas that, because of my background were graded lowest, were those that I already had experience in."

"The courses of 'Job Analysis' and 'Shop Organization and Management' were sort of unnecessary for me. I've run electronic shops not with 20 to 30 people but with over 500 people in the military service. These courses were anticlimactic."

"I believe those courses are very necessary, however the contents of and methods of teaching them could be improved upon."

"All courses were of excellent content and presentation. Suggest that the teaching staff 'continue' to impart a respect for the maturity of these pre-service teachers. This attitude was very much in evidence and is appreciated."

"I was enrolled in only one course, Educational Psychology, which I believe is considered a General Education rather than an Industrial Education course. However, because the class was composed almost entirely of I. E. students, the instructor was able to slant the material toward real classroom and shop problems encountered in teaching vocational trainees. It is my understanding that the same course on campus is slanted more toward the typical academic high school student and is somewhat more theoretical in its approach. The instructor was able to call upon his experiences as guidance coordinator in the TAT worker training program and his past experiences as a vocational shop teacher in presenting the material. In addition, the individual case study assignments were carried out with TAT worker trainees as subjects. I felt everyone in the class benefitted from this course which stressed practical problems in vocational teaching."

JCH:ec
6/19/68

TRAINING
AND
TECHNOLOGY

Oak Ridge Associated Universities
Union Carbide Corporation
University of Tennessee

May 3, 1968

To: 1967-68 Pre-Service Teacher Institute Participants

Subject: CONTENT SURVEY OF PRE-SERVICE INSTITUTE

Training and Technology is an experimentation and demonstration project seeking to identify what contributions an industrial setting can make to vocation-technical teacher education. To this end will you please complete the following questionnaire.

Your responses to questions about the Institute will be valued and will be included in a project documentation report. For this reason we request your thoughtful comments. Future developments rely to a great extent on information received by participants.

Please insert the unsigned completed questionnaire in the attached envelope and deliver personally to Ethel Crawford, ORAU secretary by May 13, 1968.

The envelopes will be held and opened at one time by ORAU personnel, making your thoughtful responses a part of the total group report.

Thank you.

John Hamel

John Hamel, Coordinator
Experimentation and Training

JH:jc

Pre-Service Teacher Institute
September 1967 to June 1968
Content Survey

1. Which group are you in? Machining ☐ Drafting ☐

   Electronics ☐ Welding-Physical Testing ☐

2. Are you enrolled in the Institute as a part time or full time student? Consider yourself a full-time student if you have been enrolled for three or more quarters (including this quarter) carrying 15 or more quarter hours per quarter.

   Part Time ☐ Full Time ☐

3. Please rate the following as you experienced them in preparation to become a vocational-technical teacher.

	Very Good	Good	Average	Poor	Very Poor
a. Orientation - - - - - - - - - - - -					
b. Classroom facilities - - - - - -					
c. Shop or laboratory facilities - -					
d. Study facilities - - - - - - - - -					
e. Guidance (counseling & testing) -					
f. Educational advisement - - - - -					
g. U.T. General Seminars - - - - - -					

Comments: ____

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4. Please rate the following courses as to their value in preparing you to become a vocational-technical teacher.

		Please rate the courses that you were enrolled in					Did Not Take This Course
		Very Worthwhile	Worthwhile	Moderately Worthwhile	Of Little Value	Of No Value	
3010	History & Philosophy of Education						
3020	Principles & Organization of Education						
3030	Social Foundations & Curriculum						
3810	Educational Psychology: Adolescence						
2010	Basic Experiences in T&I Education						
2020	Basic Experiences in T&I Education						
2030	Basic Experiences in T&I Education						
3040	Physical Testing Technology						
3041	Physical Testing Technology						
3042	Physical Testing Technology						
3050	Welding Brazing, Cutting & Rel. Processes (U.C.)						

	Please rate the courses that you were enrolled in					Did Not Take This Course
	Very Worthwhile	Worthwhile	Moderately Worthwhile	Of Little Value	Of No Value	
3050 Welding Brazing, Cutting & Rel. Processes (Stolet)						
3051 Welding Brazing, Cutting & Rel. Processes						
3052 Welding Brazing, Cutting & Rel. Processes						
3060 Electronic Technology						
3061 Electronic Technology						
3062 Electronic Technology						
3070 Industrial Mechanical Technology (U.C.)						
3071 Industrial Mechanical Technology (U.C.)						
3072 Industrial Mechanical Technology (U.C.)						
3070 Industrial Mechanical Technology (Velin)						
3071 Industrial Mechanical Technology (Velin)						

		Please rate the courses that you were enrolled in					Did Not Take This Course
		Very Worthwhile	Worthwhile	Moderately Worthwhile	Of Little Value	Of No Value	
3072	Industrial Mechanical Technology (Velin)						
3080	Machining of Metals (U.C.)						
3081	Machining of Metals (U.C.)						
3082	Machining of Metals (U.C.)						
3080	Machining of Metals (Frady)						
3081	Machining of Metals (Frady)						
3082	Machining of Metals (Frady)						
3110	History & Philosophy of Ind. Education						
3310	Shop Organization and Management						
3320	Mtls. & Meth. for Teach. of Shop & Rel. Subjects						
4040	Physical Testing Inspection						
4041	Physical Testing Inspection						

	Please rate the courses that you were enrolled in					Did Not Take This Course
	Very Worthwhile	Worthwhile	Moderately Worthwhile	Of Little Value	Of No Value	
4042 Physical Testing Inspection						
4060 Industrial Electronics Instrumentation						
4061 Industrial Electronics Instrumentation						
4062 Industrial Electronics Instrumentation						
4080 Ind. Mtls., Processes & Fabrication of Metals (U.C.)						
4081 Ind. Mtls., Processes & Fabrication of Metals (U.C.)						
4082 Ind. Mtls., Processes & Fabrication of Metals (U.C.)						
4080 Ind. Mtls., Processes & Fabrication of Metals (Fraley)						
4081 Ind. Mtls., Processes & Fabrication of Metals (Fraley)						
4082 Ind. Mtls., Processes & Fabrication of Metals (Fraley)						
4090 Numerical Control						

		Please rate the courses that you were enrolled in					Did Not Take This Course
		Very Worthwhile	Worthwhile	Moderately Worthwhile	Of Little Value	Of No Value	
4110	Foremanship Training by Conference Method						
4120	Job Analysis						
4210	Methods of Teaching Shop & Related Subjects						
4310	Curriculum Building in T&I Subjects						
4410	Directed Teaching						
4420	Directed Teaching						

Comments on IE courses: ____

5. Name the most helpful experience(s) you received, as a prospective teacher while attending the Institute, in the University of Tennessee part of the program.

6. If you had any Institute experience(s) in the University of Tennessee part of the program that were of little value to you as a prospective teacher, please comment.

7. Name the most helpful experience(s) you received, as a prospective teacher while attending the Institute, in the Union Carbide part of the program.

8. If you had any Institute experience(s) in the Union Carbide part of the program that were of little value to you as a prospective teacher, please comment.

9. Can you suggest any way that the University of Tennessee portion of the program can be improved.

10. Can you suggest any way that the Union Carbide portion of the program can be improved.

JCH:ec
5/2/68

APPENDIX H

OUTLINE OF VOCATIONAL-TECHNICAL INSTITUTE COURSES APPROVED BY UNIVERSITY OF TENNESSEE SENATE FOR INDUSTRIAL EDUCATION DEPARTMENT CURRICULUM

The following courses were developed by the Vocational-Technical Teacher Institute for its pre-service and in-service programs. In the spring of 1967 they were added to the curriculum of the University of Tennessee Industrial Education Department by action of the University Senate. Included are 27 quarter hours of coursework in each of the five technical areas offered by the Institute, plus nine hours of numerical control and nine hours of directed teaching. The last four courses listed consist of the graduate and undergraduate levels of "Seminar in Industrial Education" and "New Developments in Industrial Education." These courses were designed specifically for the In-Service Institute. The remaining courses were designed for use in either the In-Service or Pre-Service Institutes.

PHYSICAL TESTING TECHNOLOGY (3,3,3)

I. E. 3040-41-42

Course Description

This course is designed for the Vocational-Technical teacher to become proficient in the physical testing field and to learn the skills and techniques involved in radiography, metallography, tensile and compression testing, and other destructive and non-destructive testing methods.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of destructive and non-destructive physical testing technology to industry and production control.
2. To develop skill in the use of the more destructive and non-destructive physical testing equipment.
3. To develop a full understanding of the technical knowledge of physical testing processes, principles, and procedures.
4. To develop judgments to ascertain the proper physical testing procedures to follow for specified conditions.

Topics Covered in the Course

1. Importance of industrial physical testing procedures.
2. Visual
3. Tensile
4. Drift
5. Crush (compression)
6. Free bend
7. Guided bend
8. Nick-break
9. Impact (Izod and Charpy)
10. Pillow
11. Peel
12. Chemical analysis
13. Macrography
14. Micrography
15. Magnetic particle
16. Florescent penetrant
17. Dye penetrant
18. X-ray radiography

PHYSICAL TESTING TECHNOLOGY (cont'd.)

Topics Covered in the Course (cont'd)

19. Gamma ray radiography
20. Pressure (hydrostatic)
21. Stethoscope
22. Ultrasonic
23. Eddy current
24. Hardness

Activities

1. Laboratory work concerning the operation of destructive and non-destructive equipment.
2. Selected reading concerning physical testing technology.
3. Selected films, discussion topics, and other media to impart technical information.
4. A wide variety of materials will be tested.

TECHNICAL PHYSICAL TESTING (3,3,3)

I. E. 4043-44-45

Course Description

This course is designed for the Vocational-Technical teacher to become proficient in the physical testing field as a technician and to learn the skills and techniques necessary for technical physical testing.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of destructive and non-destructive physical testing, at the technician's level, to industry and production control.
2. To develop skill in the use of the destructive and non-destructive physical testing equipment that a technician must use.
3. To develop a full understanding of the technical knowledge of physical testing processes.
4. To develop judgments to ascertain the proper physical testing procedures to follow in a given situation.

Topics Covered in the Course

1. Importance of Physical Testing procedures
2. Non-destructive Testing
3. Destructive Testing
4. Mechanical Properties
5. Mechanical Properties I and II
6. Welding Technology I, II, and III
7. Welding Inspection I and II
8. Welding Metallurgy
9. Metallography
10. Comprehensive physical testing

Activities

1. Theory and laboratory application of tests.
2. Preparation of metallic samples for macroscopic and microscopic examination.
3. Application of various testing techniques in evaluation.
4. Compile reports.

PHYSICAL TESTING INSPECTION (3,3,3)

I. E. 4040-41-42

Course Description

This course is designed for the Vocational-Technical teacher to become proficient in the physical testing field as an Inspector and to learn the skills and techniques necessary for physical testing inspection.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of destructive and non-destructive physical testing inspection to industry and production control.
2. To develop skill in the use of destructive and non-destructive physical testing inspection procedures.
3. To develop an understanding of the technical knowledge necessary to inspect physical testing procedures.
4. To develop judgments to ascertain the proper inspection procedures for a given situation.

Topics Covered in the Course

1. Importance of Physical Testing procedures
2. Non-destructive Testing
3. Destructive Testing
4. Materials seminars
5. Metallography
6. Materials seminars
7. Special testing
8. Materials evaluation
9. Basic Metallurgy

Activities

1. Laboratory work concerning the operation of destructive and non-destructive physical testing equipment.
2. Selected readings concerning physical testing technology.
3. Application of various testing techniques in evaluations.
4. Compile reports.

WELDING, BRAZING, CUTTING, AND RELATED PROCESSES (3,3,3)

I. E. 3050-51-52

Course Description

This course is designed to provide the industrial education student with an understanding of the various types of welding equipment and fundamental techniques of welding.

Purpose and Competencies

1. To develop skills and knowledge in welding application and processes.
2. To develop in the student knowledge of methods, techniques, machines, materials, and designs as they pertain to the welding industry today.
3. To develop in the student worthwhile attitudes of performance, achievement, and safety.

Topics Covered in the Course

1. Shop processes
2. Blue print reading
3. Oxyacetylene Welding I, II, III
4. Gas metal-arts Welding I, II, III
5. Welding codes and Weld
6. Joint Design
7. Soldering and brazing technology
8. Welding designs
9. Welding symbols
10. Safety

Activities

1. Laboratory work performing welding jobs.
2. Solve theoretical problems.
3. Welding in all positions.
4. Set up and test welding equipment.
5. Fabricate tools and accessories.
6. Prepare reports.

INDUSTRIAL WELDING TECHNOLOGY (3,3,3)

I. E. 4050-51-52

Course Description

This course is designed to provide the industrial education student with an understanding of the design and fabrication of welded industrial products.

Purpose and Competencies

1. To provide the student an opportunity to develop his creative abilities in the design and fabrication of welded industrial products.
2. To develop in the student a degree of skill in the use and care of welding equipment that will be beneficial to the future teacher of industrial education.
3. To develop an appreciation of the contributions of the welding industry to industrial progress.

Topics Covered in the Course

1. Shop processes
2. Safety
3. Metallic arc welding I, II, III
4. Fusion and hard soldering
5. Welding of light, medium, and heavy gauge steel
6. Welding ferrous and non-ferrous metals
7. Welding theory
8. Industrial processes

Activities

1. Laboratory work performing welding jobs.
2. Solve theoretical problems.
3. Welding in all positions.
4. Set up and test welding equipment.
5. Fabricate tools and accessories.
6. Prepare reports.

ADVANCED WELDING, BRAZING, AND ADHESIVE BONDING PROCEDURES (3,3,3)

I. E. 4053-54-55

Course Description

This course is designed to provide the industrial education student with an understanding of advanced welding and bonding techniques and processes, metallurgical aspects of base and filler metals, and advanced testing procedures of industrial welding and bond joints.

Purpose and Competencies

1. To develop skills in as many welding processes as possible.
2. To develop technical knowledge in sophisticated welding processes.
3. To develop worthwhile attitudes of performance, achievement, and safety.

Topics Covered in the Course

1. Shop procedure
2. Safety
3. Advanced instruction in:
    a. Oxy-fuel gas welding, cutting, and brazing
    b. Electric arc welding, cutting, and brazing
    c. Resistance welding and brazing
    d. Adhesive bonding
    e. Metal spraying
    f. Special joining procedures including thermit brazing, induction welding, friction welding, and others.
4. Automatic and semiautomatic welding
5. Metallurgy
6. Testing procedures and standards.

Activities

1. Laboratory work performing experiments.
2. Solve theoretical problems.
3. Welding, brazing, and bonding by using different techniques.
4. Set up and test welding equipment.
5. Fabricate tools and accessories.
6. Prepare reports.

ELECTRONIC TECHNOLOGY (3,3,3)

I. E. 3060-61-62

Course Description

This course is designed to provide the industrial education student with an understanding of the basic principles and application of electronics.

Purposes and Competencies

1. To develop an understanding of the basic principles of electronics.
2. To develop a knowledge of the materials, components, and equipment of the electronics industry.
3. To develop safe work habits and techniques in the use of electrical equipment.
4. To develop judgments necessary for success as a teacher in the electronics field.

Topics Covered in the Course

1. Shop processes
2. Basic electricity
3. Alternating current and direct current theory
4. Vacuum tube and transistor Theory I
5. Vacuum tube and transistor Theory II
6. Basic electronic circuits and systems
7. Semiconductors
8. Test equipment

Activities

1. Laboratory work performing experiments.
2. Solve theoretical problems.
3. Trouble shoot systems and circuits using special test equipment.
4. Compile reports on components, circuits, and procedures.

INDUSTRIAL ELECTRONICS INSTRUMENTATION (3,3,3)

I. E. 4060-61-62

Course Description

This course is designed to provide the industrial education student with an understanding of control instruments and their application to industrial processes.

Purpose and Competencies

1. To develop an understanding of the basic principles of control instruments.
2. To develop an understanding of the application of commercially available instruments.
3. To acquaint the student with the dynamics of open and closed cycle control systems.
4. To develop skill in the use and calibration of control instruments.

Topics Covered in the Course

1. Shop practice
2. Industrial process (pneumatic) Instruments I
3. Industrial process Instruments II
4. Industrial process Instruments III
5. Commercially available instruments
6. Dynamic and static calibration of instruments
7. Open and closed cycle control systems
8. Control elements and techniques

Activities

1. Laboratory work performing experiments.
2. Solve theoretical problems.
3. Trouble shoot systems with commercial test equipment.
4. Calibrate control instruments.
5. Compile reports on electronic instrumentation.

INDUSTRIAL ELECTRONICS (3,3,3)

I. E. 4063-64-65

Course Description

This course is designed to provide the industrial education student with an understanding of the basic principles, concepts, and techniques in industrial application of electronics.

Purpose and Competencies

1. To develop an understanding of the basic principles, concepts, and techniques in industrial application of electronics.
2. To develop skill in analysis of complex circuits for fundamental principles and concepts which facilitate trouble shooting of industrial equipment.
3. To develop a knowledge of principles and concepts involved in multi-vibrators, oscillators, pulse generators, and certain computer circuits.
4. To form judgments necessary to teach industrial electronics.

Topics Covered in the Course

1. Shop practice.
2. Industrial electronics equipment I
3. Industrial electronics equipment II
4. Industrial electronics equipment III.
5. Special purpose circuitry
6. Test equipment
7. Circuit analysis
8. Computer systems and circuits

Activities

1. Laboratory work performing experiments.

INDUSTRIAL ELECTRONICS (cont'd.)

Activities (cont'd.)

2. Solve theoretical problems.
3. Trouble shoot systems and circuits using special test equipment.
4. Compile reports on components, circuits, and procedures.

INDUSTRIAL MECHANICAL TECHNOLOGY (3,3,3)

I. E. 3070-71-72

Course Description

This course is designed to provide the industrial education student with the ability to design, test, analyze data, and prepare technical reports on a variety of mechanical systems and equipment.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of designing, testing, and reporting technology to industry and production control.

2. To develop skill in designing mechanical systems and equipment from engineer sketches and drawings.

3. To develop a full understanding of the technical knowledge of design procedures, principles, and processes.

4. To develop judgments to ascertain the proper procedures to follow for specified conditions and situations.

Topics Covered in the Course

1. Shop processes
2. Shop safety
3. Lettering
4. Geometrical construction
5. Multiview drawing
6. Auxiliary and sectional views
7. Technical sketching
8. Dimensioning and Tolerancing
9. True position dimensioning
10. Threads fasteners and springs
11. Intersections and developments
12. Working drawings
13. Analysis of spatial problem
14. Gearing and cams
15. Writing technical reports
16. Graphs

Activities

1. Laboratory work and assignments concerning mechanical systems and equipment.

2. Design and produce projects for their instructional value.

3. Selected readings concerning industrial mechanical technology.

4. A wide variety of materials will be tested.

INDUSTRIAL DESIGN (3,3,3)

I. E. 4070-71-72

Course Description

This course is designed to provide the industrial education student with an understanding of basic design with industrial materials.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of the industrial design to industry.
2. To develop skill in the use of industrial materials in basic design.
3. To develop a full understanding of the techniques and language of industry.
4. To develop judgments to ascertain the proper design procedures to follow for specified conditions.

Topics Covered in the Course

1. Descriptive geometry
2. Nomography
3. Machine elements:
    a. Cams
    b. Gears
    c. Dies
    d. Castings, forgings, and stampings
4. Basic design with industrial materials
5. Design problems
6. Applied industrial design

Activities

1. Selected readings concerning industrial design.
2. Laboratory work concerning industrial design.

INDUSTRIAL DESIGN (cont'd.)

Activities (cont'd.)

3. Selected film, discussion topics, and other media to impart technical information.
4. Compile reports.

TOOL AND MACHINE DESIGN (3,3,3)

I. E. 4073-74-75

Course Description

This course is designed to provide the industrial education student with an understanding of tool and machine design, calculations, design systems, and designing procedures.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of tool and machine design to industry and production control.
2. To develop skill in the use of tool and machine design equipment.
3. To develop a full understanding of the technical and related knowledge of tool and machine designing, principles, processes, and procedures.
4. To develop judgments to ascertain the proper tool and machine design procedures to follow for specified conditions.

Topics Covered in the Course

1. Shop procedures
2. Safety
3. Preliminary sketches
4. Design calculations
5. Machine and tool drawings
6. Design of heating--ventilation, air-conditioning, and piping systems
7. Fabrication methods
8. Bills of material
9. Working and detailed drawing
10. Cost estimates

Activities

1. Laboratory work and assignments concerning tool and machine design.
2. Individual and group design projects.
3. Selected reading.
4. Compile reports
5. Selected films, discussion topics, and other media to impart technical information.

MACHINING OF METALS (3,3,3)
I. E. 3080-81-82

Course Description

This course is an introduction to machine shop theory and procedures which provides information and practice in using the basic machine tools.

Purpose and Competencies

1. To develop skill in metal working through the safe use of tools.
2. To develop knowledge of machine tools and their operation.
3. To develop skill and understanding in the use of drawings.
4. To develop appreciation of good design and workmanship.

Topics Covered in the Course

1. Shop procedure.
2. Safety.
3. Precision measurement.
4. Construction of the engine lathe.
5. Operation of the engine lathe.
6. Shaper.
7. Milling machine.
8. Cutting speeds.
9. Cutting forces.
10. Drilling machine.
11. Precision grinding.
12. Sawing.

Activities

1. Laboratory work performing experiments.
2. Solving theoretical problems.
3. Set up and testing of machining equipment.
4. Compiling reports.
5. Completing projects.

INDUSTRIAL MATERIALS, PROCESSES, AND FABRICATION OF METALS (3,3,3)

I. E. 4080-81-82

Course Description

This course is a study of the basic tools, materials, processes, designing, planning and fabrication, industrial processes, and decorating of metal products used in a number of metal working areas.

Purpose and Competencies

1. To develop a knowledge of machine tools and their operation that are used in industry today.
2. To develop skill in designing, planning, and fabrication of metal products.
3. To develop a full understanding of basic processes, materials, and equipment used in forming, fabrication, and decoration of metal products.
4. To develop judgments to ascertain the proper method and procedure for specified conditions.

Topics Covered in the Course

1. Shop procedure.
2. Safety.
3. Machining tools.
4. Machining processes.
5. Materials.
6. Designing.
7. Planning.
8. Fabrication.
9. Industrial processes.
10. Mass production application.
11. Properties of metals.
12. Decorating metal products.
13. Non-ferrous metals and alloys.

Activities

1. Laboratory work concerning the operation of machining equipment.
2. Selected readings concerning machinery.
3. Selected films, discussion topics, and other media to impart technical information.
4. Selected projects dealing with machine shop.

PRECISION FORMING AND SHAPING OF METALS
(3,3,3) I. E. 4083-84-85

Course Description

This course is an advanced study of machine tool techniques related to the production of precision-made metal parts with emphasis on automatically controlled machine tools.

Purpose and Competencies

1. To develop skill in advanced machine tool techniques.
2. To develop knowledge of specialized machine-tool techniques.
3. To develop an understanding of methods and procedures in the set up and scheduling of automatically controlled machine tools.
4. To develop appreciation of good design and workmanship.

Topics Covered in the Course

1. Shop procedures.
2. Safety.
3. Advanced machine tool techniques.
4. Production of precision-made metal parts.
5. Specialized machine tool techniques.
6. Methods and procedures in the set up and scheduling of automatically controlled machine tools.

Activities

1. Laboratory work performing experiments.
2. Solving theoretical problems.
3. Set up and testing of machining equipment.
4. Compiling reports.
5. Completing projects.

NUMERICAL CONTROL (3,3,3)

I. E. 4090-91-92

Course Description

A course designed to enable the industrial education student to become proficient in the numerical control systems, tooling required, manual programming, automatic programming, automatic programming language, and the use of the automatic programmer as a computer.

Purpose and Competencies

1. To develop an understanding of the importance and relationship of numerical control to industry and production control.
2. To develop skill in the use of the more common numerical control systems.
3. To develop a full understanding of the technical knowledge of numerical control systems, required tooling, manual and automatic programming, and other numerical control procedures.
4. To develop judgments to ascertain the proper numerical procedures for a specified condition.

Topics Covered in the Course

1. Positioning and continuous paths control.
2. Machine tools and their relation to numerical control.
3. Automatically programmed tools and languages (APT).
4. Programming for drills, mills, turning machines, lathes, and inspection machines.
5. Shop procedures.
6. Safety.
7. Required tooling.
8. Cost savings.
9. Manual programming.
10. The use of APT as a computer.

Activities

1. Laboratory work and assignments pertaining to numerical control.
2. Individual and group numerical control projects.
3. Selected films, discussion topics, and other media to impart technical information.
4. Selected readings.
5. Compile reports.

DIRECTED TEACHING (9)
I. E. 4420

Course Description

Guided observation and teaching in trade, industrial, and/or technical programs in secondary, area, adult, post secondary, and junior college industrial vocational and technical curricula.

Purpose and Competencies

1. To provide an opportunity for prospective trade, industrial, and technical teachers to observe qualified and competent instructors in their daily teaching and non-teaching activities and duties.

2. To enable the industrial education student to practice and develop his instructional skills under the guidance of competent instructors in the environmental habitat of his prospective career.

3. To develop an awareness and understanding of and skill in the multiple relationship of the teacher to fellow teacher, student, parents, non-professional school staff members, administrative officers and bodies, teacher organizations, and labor, industrial, and other community groups.

Topics Covered in the Course

1. Orientation to directed teaching program.

2. Orientation to school system, instructional program, and community.

3. Procedures for guided observation.

4. Inter-relationships of teacher to instructional program, staff, administration, students, and community.

5. Duties and responsibilities of the teacher.

6. Duties and responsibilities of the school administrative bodies.

7. Effective use of student organizations.

8. Effective use of advising committees.

9. Community and school instructional resource materials.

10. Instructional course material development and duplication.

11. Effective time planning and scheduling.

Activities

1. Develop course instructional materials.

2. Observe proficient teacher instruct in the classroom.

3. Teacher classroom and laboratory classes.

DIRECTED TEACHING (cont'd.)

Activities (cont'd.)

4. Observe and participate in staff teacher meetings.
5. Participate in shop and laboratory organization and management activities.
6. Observe and participate in intra- and extra-school relationship activities.
7. Attend conferences with directed teaching coordinator, supervising teacher, and others.
8. Prepare written reports on directed teaching activities.
9. Selected reading to reinforce and broaden the directed teaching experience.

SEMINAR IN INDUSTRIAL EDUCATION
(In-Service Institute) (3,3,3)
I. E. 4510-11-12

Course Description

Seminar sessions will be devoted to discussions of educational innovations, timely current events, problems, and other topics associated with the field of industrial education.

Purpose and Competencies

1. To inform the participants of local, state, national, and international current events and problems affecting and/or associated with industrial education.
2. To provide the participants with the opportunity to exchange information and ideas related to industrial education topics.
3. To enable the participants to gain experience in effective seminar techniques and procedures.

Topics Covered in the Course

1. Procedures and techniques in planning, conducting, and participating in seminar sessions.
2. Topics selected as to their timeliness and the needs of each particular group of participants.

Activities

1. Do individual research on topics to be discussed.
2. Prepare materials for discussion.
3. Conduct seminar sessions as appointed.
4. Act as active discussants.
5. Write reports evaluating each seminar session as to conduct and content.

New Developments in Industrial Education
(3,3,3) (In-Service Institute)
I. E. 4520-21-22

Course Description

A course designed to inform trade and industrial majors of new developments, pressing problems, and recent trends in the field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

Purpose and Competencies

1. To inform trade and industrial majors of new developments, pressing problems, and future trends in vocational industrial education.
2. To develop an awareness of the multiple forces exerting their influence on vocational industrial education.
3. To develop the ability to recognize and evaluate events and information which will affect vocational education.

Topics Covered in the Course

1. Topics to be selected as to their timeliness and the needs of each particular group of participants.

Activities

1. Lectures and class discussions on new industrial education developments.
2. Viewing of selected films, charts, slides, and other visual aid materials.
3. Selected reading assignments on new developments.
4. Written summary reports on appropriate topics.

SEMINAR IN INDUSTRIAL-TECHNICAL EDUCATION (3,3,3) (In-Service Institute)
I.E. 5510-20-30

Course Description

The seminar sessions will be devoted to presentations and discussions of topics exploring the ramifications of vocational and technological innovations in relation to an increasing technically oriented society.

Purpose and Competencies

1. To inform the participants of recent research concerning the various phases of vocational education, technological innovations, current events, and other academic areas.
2. To explore and discuss these topics as to their relevancy, impact, and implications to vocational-technical educations.
3. To provide the participants with the opportunity to exchange ideas and information concerning the relationship of vocational-technical education with a technically oriented society.

Topics Covered in the Course

1. Review of techniques and procedures in planning, conducting, and participating in seminar sessions.
2. Topics selected as to their timeliness and the needs of each particular group of participants.

Activities

1. To explore and conduct informative explorations on research in various topics.
2. Prepare materials for discussion.
3. Conduct seminar sessions as appointed.
4. Act as active discussant.
5. Write reports evaluating each seminar session as to conduct and content.

NEW DEVELOPMENTS IN INDUSTRIAL-TECHNICAL EDUCATION (3) (In-Service Institute)
I. E. 5540

Course Description

An intensive course designed to acquaint graduate students with recent significant developments and emerging trends in vocational and technical education as presented by nationally recognized authorities in the field.

Purpose and Competencies

1. To inform the industrial and technical educators of recent significant research, developments, and emerging trends in vocational and technical education.

2. To develop an awareness of the multiple forces exerting their influence on vocational and technical education.

3. To develop the ability to recognize and evaluate events and information which will affect vocational and technical education.

Topics Covered in the Course

1. Topics to be selected as to their timeliness and the needs of each particular group of participants.

Activities

1. Lectures and class discussions on new industrial education developments.

2. Viewing of selected films, charts, slides, and other visual aid material.

3. Selected reading assignments on new developments.

4. Written summary reports on appropriate topics.

APPENDIX I

PRINCIPAL STAFF MEMBERS
VOCATIONAL-TECHNICAL TEACHER INSTITUTE

UNIVERSITY OF TENNESSEE

Dr. D. E. Maurer
Institute Director

G. K. LaBorde
Guidance Coordinator

Terrence E. Powell
Teacher Trainer

Donald D. Riggs
Teacher Trainer

T. D. Bolinger
Teacher Trainer

John Luton
Teacher Trainer

ORAU

W. H. Russell
TAT Project Director

J. C. Hamel
Coordinator of Training
and Experimentation

T. J. Fritts
Supportive Services Officer

J. L. Echols
Information Officer

D. J. Vernine
Administrative Officer

UNION CARBIDE

J. L. Waters
Y-12 Program Manager

B. R. Pearson
Training Director

F. C. Lowry
Assistant to Y-12
Program Manager

B. D. Lanter
Physical Testing and
Welding Supervisor

Frank K. Booth
Electronics Supervisor

Joseph E. Miller
B. G. Myers
J. O. Nicholson
Mechanical Engineering
Technology Supervisors

Richard E. Dew
Machining Supervisor

George A. Burton
Physical Testing Supervisor
(Spring Quarter 1968)

E. N. Rogers
Welding Supervisor
(Spring Quarter 1968)